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VOLUME 12, NO. 1

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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NOTE

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, μl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter		
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotidephosphate
dl	deciliter		
DNA	deoxyribonucleic acid	NADPH	reduced nicotinamide adenine dinucleotidephosphate
ED_{50}	median effective dose(s)		
EDTA	ethylenediamine tetraacetic acid	ng	nanogram (10^{-9})
e.g.	for example	nm	nanometer(s)
EEG	electroencephalogram	Pa	ambient pressure
ESR	erythrocyte sedimentation rate	PAS	periodic acid - Schiff
g	gram(s)	pg	picogram (10^{-12})
μg	microgram(s)	pgEq	picogram equivalent(s)
Hz	Hertz	p.o.	orally
hr	hour(s)	ppb	parts per billion
Ig	immunoglobulin(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K_m	Michaelis constant	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
μM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, μCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

0001 AN ULTRASTRUCTURAL STUDY OF OSMIOPHILIA IN NORMAL HUMAN OESOPHAGEAL EPITHELIUM.

(Eng.) Logan, K. R.; Milne, G.; Hopwood, D. (Ninewells Hosp. and Medical Sch., Dundee, DD2, 1UB, Scotland). *Histochemistry* 53(2):183-187; 1977.

The forming face of the Golgi stack was studied in biopsy specimens of normal human esophagus, using the prolonged osmication technique. The forming face of the Golgi apparatus was demonstrated in the basal and lower prickle cells. These cells also showed osmium deposition in their mitochondria, endoplasmic reticulum, perinuclear cisternae, and lysosomes. The capillary endothelial cells also showed osmium deposition in their Golgi apparatus and endoplasmic reticulum. These studies suggest that the Golgi apparatus may be involved in forming membrane coating granules, similar to those previously described in skin, vagina, and buccal mucosa.

0002 DISTRIBUTION, ONTOGENY AND ULTRASTRUCTURE OF THE MAMMALIAN SECRETIN CELL.

(Eng.) Larsson, L. I.; Sundler, F.; Alumets, J.; Hakanson, R.; Schaffalitzky de Muckadell, O. B.; Fahrenkrug, J. (Inst. Medical Biochemistry, Univ. Aarhus, DK-8000 Aarhus C, Denmark). *Cell Tissue Res.* 181(3):361-368; 1977.

Secretin cells were studied immunocytochemically in adult rats, cats, pigs, and man, and in fetal and young rat tissues. Secretin cells were demonstrated in the duodenum and jejunum of all species. Calculations on the relative frequency of such cells indicate that the bulk of secretin occurs in the jejunum, which supports the view that secretin may be released by physiological stimulants other than hydrochloric acid. Ultrastructural identification of cat and pig secretin cells confirmed their identity with the ultrastructurally defined S cells, and staining experiments revealed that secretin cells were argyrophilic. Secretin cells were detected in the 17-day-old fetal rat duodenum and showed a developmental pattern similar to that displayed by gastrin cells. Secretin may play a role in the early regulation of growth of the fetal gastrointestinal tract.

0003 MORPHOLOGICAL CHANGES IN THE SMALL INTESTINE FOLLOWING JEJUNO-ILEAL SHUNT IN PARENTERALLY FED RATS.

(Eng.) Fenyo, G.; Hallberg, D.; Soda, M.; Roos, K. A. (Karolinska sjukhuset, Stockholm, Sweden). *Scand. J. Gastroenterol.* 11(6):635-640; 1976.

The importance of the presence of food in the intestinal lumen during adaptation to diminished intestinal absorptive surface was studied in rats undergoing a jejuno-ileal bypass (85% of the small intestine excluded) and in sham-operated rats. Body weights of sham-operated and shunt-operated rats fed p.o. with pellets were 151 ± 2.8 and 151 ± 22 g, resp., at the time of surgery and 231 ± 4.1 and 156 ± 4.3 g, resp., 2 weeks after operation. Sham- and shunt-operated rats given total parenteral nutrition (TPN) had body weights of 157 ± 1.6 and 161 ± 8.2 g, resp., at the time of operation and 206 ± 7.5 and 192 ± 8.3 g, resp., 2 weeks after operation. The weight differences were significant at 2 weeks after surgery between pellet-fed, sham-, and shunt-operated rats ($p<0.001$) and between pellet fed and TPN rats in both surgical groups. The functioning part of the small intestine of shunt-operated rats was hypertrophic in both p.o. and TPN fed rats in comparison with sham-operated rats with the corresponding nutrition. When intestinal wet and dry weight per 3-cm intestine were determined from five small intestinal segments 2 weeks after operation, both p.o. and TPN nourished shunt-operated rats showed significantly ($p<0.05$ or less in all cases) increased wet and dry weights in all segments except the top of the blind loop where there was a significant decrease ($p<0.001$) for p.o. fed rats and no significant change for TPN nourished rats. Villus height in both p.o. and TPN nourished shunt-operated rats was significantly ($p<0.01$ or less in all cases) increased in all segments but the top of the blind loop (no significant change) compared with the villus height of sham-operated controls. The absolute villus height was significantly ($p<0.05$ or less) greater in p.o. fed rats than in TPN nourished rats in each surgical group. The percentage differences in villus height between shunt- and sham-operated rats were higher in the TPN group than in p.o. fed rats. The results demonstrate that rats with adequate parenteral nutrition 2 weeks after 85% small intestinal bypass develop hypertrophic changes of the intestinal mucosa, indicating the existence of a nonfood-dependent mechanism in the development of adaptive mucosa changes. Nevertheless, the presence of food seems to stimulate quantitatively greater hypertrophic changes.

0004 FUNCTIONAL ALTERATIONS OF LIVER MITOCHONDRIA IN CHRONIC EXPERIMENTAL ALCOHOLISM.

(Eng.) Koch, O. R.; Bedetti, C. D.; Gamboni, M. (Facultad de Medicina, Universidad de Buenos Aires, J. E. Uriburu 950, Buenos Aires, Argentina). *Exp. Mol. Pathol.* 25(3):253-262; 1976.

Morphologic and functional alterations of mitochondria obtained from nonfatty livers of male rats fed a super diet (vitamin and lipotrope-enriched) for 4 months which included a 25% sucrose-32% ethanol mixture (group A), were compared with mitochondrial alterations observed in the livers of three control groups of rats. In the control groups, alcohol was isocalorically replaced by sucrose (group B), by fat (group C), or by a basal diet (group D). Livers from group A rats showed fatty changes similar to those seen in livers of the control groups of rats. However, numerous megamitochondria were observed in group A livers; their preferential hepatocytic lobular location was in midzonal areas, although they were also found in centrilobular hepatocytes. In control livers, the hepatocytes predominantly affected were in periportal areas, and no megamitochondria were observed. Ultrastructurally, group A enlarged mitochondria displayed bizarre shapes. Their cristae were diminished in number, and helical filaments were occasionally observed in dilated cristae and/or in the outer mitochondrial space. The ultrastructural configuration of hepatocytes from control groups B, C, and D was normal. Maximum mitochondrial respiration rate (ng-atoms of oxygen/min/mg protein) in group A rats was significantly lower ($p < 0.001$, 83 ± 27) than that for group B (176 ± 16), group C (163 ± 28), and group D (159 ± 31) rats when succinate (10 mM) was used as substrate. A similar pattern was observed when L-malate (5 mM)-L-glutamate (5 mM) was used as substrate ($p < 0.001$). When β-hydroxybutyrate (5 mM) was used as substrate, the maximal mitochondrial respiration rate of group A rats (45 ± 9) was significantly ($p < 0.05$) lower than that of group B (61 ± 9) and group C (59 ± 12) rats but not significantly different from that of group D rats (57 ± 15). When succinate or malate-glutamate was used as substrate, the coupling of oxidative phosphorylation in group A rats was similar to that of controls, but with β-hydroxybutyrate a small reduction in coupling was noted in group A rats compared with group B and C rats ($p < 0.02$). These results suggest that hepatic mitochondrial respiration is significantly altered when ethanol is supplied to rats at high levels over long periods and when a nutritional basal diet that does not induce fatty liver is used.

0005 ULTRASTRUCTURAL CYTOCHEMISTRY OF THE SECRETORY GRANULES OF THE HAMSTER SUBMANDIBULAR GLAND. (Eng.) Bloom, G. D.; Carlsoo, B.; Danielsson, A.; Wahlin, T. (Dept. Histology, Univ. Umea, S-90187, Umea, Sweden). *Histochemistry* 51(4):261-268; 1977.

The ultrastructure and cytochemistry of the secretory granules of the male hamster submandibular salivary gland were studied. After fixation in glutaraldehyde followed by osmium tetroxide, the granules were seen to exhibit a characteristic bipartite substructure, with an electron lucid crescenteric rim and a more dense central core. Two regions of the granules were visualized in specimens primarily fixed in Millonig's osmium tetroxide or in potassium permanganate. The electron lucid peripheral portion of the membrane bounded secretory granules further displayed a strong positive reaction after staining of ultrathin sections with the periodic acid-chromic acid-(PA-CrA)-silver technique. The strong periodate reactivity of the rim relative to the core suggested a difference in mucin composition of the two granule regions. With the PA-CrA-silver staining technique, a positive reaction was also observed within the Golgi apparatus of the acinar cells.

0006 QUANTITATIVE AGE CHANGES IN THE HISTOLOGICAL STRUCTURE OF HUMAN SUBMANDIBULAR SALIVARY GLANDS. (Eng.) Scott, J. (Univ. Liverpool, Pembroke Place, P.O. Box 147, Liverpool, L69 3BX, England). *Arch. Oral Biol.* 22(3):221-227; 1977.

The nature, extent, and rate of age-related volumetric tissue changes were examined in human submandibular salivary glands. The glands were obtained from a series of 96 necropsies evenly representative of sex and all decades between 16 and 95 yr. With increasing age, the volume of parenchyma steadily lessened ($p < 0.001$) while the proportions of other tissues rose; this effect was due mainly to loss of acinar tissue, as the volume of ducts underwent a gradual net increase with increasing age. There was an acceleration in the rates of volumetric tissue changes in the two final decades of life. A progressive increase in vascular volume was related to increasing levels of degenerative vascular disease that may, through ischemia, bear some causal relation to the ageing atrophy of parenchyma. The rates of ageing changes were similar in each sex.

0007 AFFERENT ACTIVITY OF THE STOMACH VAGAL AND SYMPATHETIC PATHWAYS IN RELATION TO THERMAL EFFECTS ON ITS WALLS. (Rus.) Nozdratchev, A. D.; Pulatova, M. D.; Tersunov, Z. T.; Chubarova, N. I. (Pavlov's Inst. Physiology, Acad. Science USSR, Leningrad, USSR). *Fiziol. Zh. SSSR* 63(6):896-903; 1977.

0008 ENDOCRINE CELLS OF THE GUT. II. DISTRIBUTION AND THE BASIS FOR ULTRASTRUCTURAL IDENTIFICATION. (Pol.) Mirecka, J. (Z Zakladu Histologii IBM AM, Cracow, Poland). *Przegl. Lek.* 34(4):419-422; 1977.

0009 COMPARATIVE RADIOLOGICAL AND MORPHOLOGICAL STUDY OF THE HUMAN PANCREAS. 2. MORPHOMETRIC INVESTIGATION OF THE HUMAN PANCREATIC DUCT SYSTEM. (Ger.) Schmitz-Moormann, P.; Hein, J.; Thoma, W.; Ihm, P. (Pathologisches Institut der Universitat Marburg, D-3550 Marburg/Lahn, W. Germany). *Anat. Anz.* 141(5):507-511; 1977.

0010 PECULIARITIES OF THE VENOUS BED HISTOLOGY IN THE HEMORRHOIDAL ZONE OF HUMAN RECTUM. (Rus.) Melman, E. P.; Datsun, I. G. (Ivano-Frankovsk Medical Inst., Ivan-Frankovsk, USSR). *Arkh. Anat. Gistol. Embriol.* 73(8):59-65; 1977.

0011 OCCURRENCE OF PSEUDOISOCYANINE-POSITIVE ENDOCRINE CELLS IN THE MIDGUT OF THE HAMSTER (Cricetulus griseus). (Ger.) Hahn von Dorsche, H.; Hartelt, E.; Fehrmann, P.; Krause, R. (Anatomisches Institut der Ernst-Moritz-Arndt-Universitat Greifswald, Friedrich-Loeffler Strasse 23c, DDR-22 Greifswald, E. Germany). *Acta Histochem.* 59(1):168-171; 1977.

0012 CONSTRUCTION OF MILLIGAN AND MORGAN'S ANORECTAL RING. (Spa.) Gomez Oliveros, L.; Forcada Jimenez, M. (Facultad de Medicina, Universidad Complutense de Madrid, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(4):377-390; 1977.

0013 EVOLUTIONARY CHANGES IN THE ESOPHAGEAL LINING OF VERTEBRATES AND MAN IN THE LIGHT OF THE PHYLEMBRYOGENESIS THEORY. (Rus.) Bazhanov, A. N. (Tselinograd Medical Inst., Tselinograd, USSR). *Arkh. Anat. Gistol. Embriol.* 71(10):61-67; 1976.

0014 HISTOLOGICAL AND ULTRASTRUCTURAL STUDIES OF THE ISOLATION OF RAT SMALL INTESTINE EPITHELIAL CELLS. (Ita.) Cusaro, G.; Marchetti, C.; Poggi, P. (Istituto di Fisiologia umana, Universita di Pavia, Pavia, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(5):371-377; 1976.

0015 THE ULTRASTRUCTURE OF ENTEROCYTES OF THE UPPER PART OF THE MOUSE SMALL INTESTINAL VILLI. (Rus.) Parshkov, E. M.; Brodsky, R. A.; Pogudina, N. A. (Inst. Medical Radiology, Acad. Medical Sciences USSR, Obninsk, USSR). *Tsitologiia* 18(11):1393-1394; 1976.

0016 MORPHO-FUNCTIONAL PECULIARITIES OF THE ENDOCRINE CELLS OF THE SMALL INTESTINE IN CHILDREN. (Rus.) Gavalov, S. M.; Korostyshevskaya, I. M.; Vinogradova, M. S.; Yakovleva, V. I. (Inst. Cytology and Genetics, Siberian Branch of USSR Acad. Sciences, Novosibirsk, USSR). *Vopr. Okhr. Materin. Det.* 21(9):23-28; 1976.

See also, 0021, 0074, 0081, 0088, 0118, 0148, 0218, 0223, 0228, 0229, 0232, 0235, 0236, 0242, 0244, 0246, 0248, 0249, 0282, 0681.

ABSORPTION - EXCRETION - TRANSPORT

0017 INCREASE IN HUMAN INTESTINAL PERMEABILITY FOLLOWING INGESTION OF HYPERTONIC SOLUTIONS. (Eng.) Laker, M. F.; Menziew, I. S. (St. Thomas' Hosp. Medical Sch., Lambeth Palace Rd., London SE1 7EH, England). *J. Physiol. (Lond.)* 265(3):881-894; 1977.

A simple oral loading technique was used to investigate the intestinal permeability of 21 healthy adults following the ingestion of lactulose (L) solutions made hypertonic by the addition of several solutes. The subjects were given 100 ml of a solution containing 5 g L and 20, 40, or 60 g sucrose. Some of these subjects were also tested with L solutions containing 30 g glucose, 12 g glycerol, or 22 g mannitol. The different solutions were given to the subjects in varied order, and there was a 3-day interval between tests. After each test, the urine was collected for 5 hr, and the amount of L excreted was quantitated by paper chromatography. The 5-hr L excretions after ingestion of an L solution without sucrose (isotonic control) were 10-30 mg (median, 15). They rose to 11-50 mg (median, 17) after 20 g sucrose, 8-127 mg (19) after 40 g sucrose, and 12-134 mg (33) after 60 g sucrose. Analysis of variance calculations showed a significant regression ($p<0.01$). Eighteen of the subjects received the glucose-containing loads, and they excreted 13-172 mg (median, 41) L. The amount of L excreted over 5 hr from four subjects given the mannitol loads was 8.9, 9.5, 8.9, and 62.5 mg; these same subjects excreted 31.7, 18.8, 17.0, and 78.5 mg L, resp., after the glycerol loads. The responses of individual subjects were reproducible and consistent. Those with high L excretion following hypertonic sucrose loads responded similarly following glucose, mannitol, and glycerol loads; those with low L transfer also behaved consistently. Intestinal permeability to L is enhanced as the solute concentration is increased, probably as a result of the increased L absorption from the intestinal lumen induced by the hypertonic solutions.

0018 EFFECT OF SEROTONIN TREATMENT ON INTESTINAL TRANSPORT IN THE RABBIT. (Eng.) Donowitz, M.; Charney, A. N.; Heffernan, J. M. (Walter Reed Army Inst. Res., Washington, DC 20012). *Am. J. Physiol.* 232(1):E85-E94; 1977.

To determine whether serotonin is an intestinal secretagogue and thus the cause of diarrhea in the carcinoid syndrome, the effect of serotonin on intestinal water and electrolyte transport was evaluated in rabbits. Two weeks of daily s.c. injection of serotonin (52 μmol/kg) suspended in oil resulted in a blood serotonin level elevated to twice that of controls. Intestinal transport was studied *in vivo* by a perfusion technique. Serotonin treatment resulted in ileal secretion and decreased mid-jejunal absorption of water and electrolytes, but did not affect water absorption in the proximal jejunum or colon. Intestinal absorption of D-glucose and the amino acid L-tryptophan and glucose-dependent water and electrolyte absorption were normal in serotonin-treated animals. Serotonin-induced ileal secretion was reversed by methysergide, a peripheral antagonist of serotonin action. No alterations in intestinal histology or permeability occurred in serotonin-treated animals. Serotonin-induced intestinal secretion was not associated with alterations in the activities of intestinal mucosal adenylate cyclase, cyclic nucleotide phosphodiesterase, or Na-K-ATPase. This rabbit model for serotonin-induced intestinal water and electrolyte secretion has many characteristics similar to those in patients with the carcinoid syndrome and diarrhea. Both exhibit blood serotonin levels elevated to at least twice normal levels, net intestinal secretion or decreased net absorption of water and electrolytes, reversal of net intestinal secretion to net absorption by methysergide treatment, normal intestinal glucose absorption, and normal glucose-dependent intestinal water and electrolyte absorption with conversion by luminal glucose of net intestinal secretion of water into net absorption.

0019 EFFECTS OF VASOACTIVE INTESTINAL PEPTIDE, SECRETIN, AND RELATED PEPTIDES ON RAT COLONIC TRANSPORT AND ADENYLATE CYCLASE ACTIVITY.

(Eng.) Waldman, D. B.; Gardner, J. D.; Zfass, A. M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA 23298). *Gastroenterology* 73(3):518-523; 1977.

Vasoactive intestinal peptide (VIP), secretin, glucagon, gastric inhibitory peptide (GIP), and partial sequences of VIP and secretin were examined for their effect on colonic transport and adenylate cyclase activity in male Sprague-Dawley rats. Net water flow was measured gravimetrically in muscle-stripped, everted sacs of ascending and descending colon. VIP and secretin, but not glucagon or GIP, stimulated colonic secretion. The sensitivity of the colonic mucosa to VIP was high; the threshold (10^{-11} M) and half-maximal dose (10^{-10} M) for the effect of VIP were 1,000 times less than the threshold (10^{-8} M) and half-maximal dose (10^{-7} M) for the effect of secretin. A subthreshold concentration of theophylline (2 mM) increased the submaximal responses to VIP or secretin up to but not beyond the maximal response to VIP alone (4.1 ± 0.2 μl/mg/30 min). The combined effect of secretin and a maximal concentration of VIP was not additive. These results indicate that VIP and secretin share the same receptor sites and/or intermediary mechanisms. VIP$_{14-28}$ acted as a partial agonist with an efficacy of 0.2 and significantly inhibited the response to VIP. Secretin$_{5-27}$ showed no secretory activity and did not inhibit the response to secretin. The lactamimide RMI 12330A (10^{-3} M) abolished the secretory response to VIP and secretin but had no effect on the secretory response to 10 mM theophylline or on control absorptive flow rate. VIP and secretin, but not glucagon or GIP, stimulated adenylate cyclase activity in homogenates of colon mucosa. The lactamimide RMI 12330A (10^{-3} M) inhibited basal adenylate cyclase activity as well as activity stimulated by VIP, secretin, prostaglandin E$_1$ and 5'-guanylyl imidodiphosphate. The results obtained in colon mucosa conform to a pattern of structural and functional homology exhibited by VIP and secretin in several tissues (fat, liver, and pancreatic acinar cells), which sets them apart from glucagon and GIP. The mode of action of VIP and secretin on colonic secretion appears to involve the adenylate cyclase-cylic AMP system. The abundance of VIP in the colon of many species and the high sensitivity of transport mechanisms to VIP raise the possibility that VIP may play a local (i.e., paracrine and/or neurocrine) role in the regulation of colonic transport.

0020 THE KINETICS OF ETHANOL ABSORPTION AND ELIMINATION IN TWINS AND SUPPLEMENTARY REPETITIVE EXPERIMENTS IN SINGLETON SUBJECTS.

(Eng.) Kopun, M.; Propping, P. (Institut fur Zellforschung am Deutschen Krebsforschungszentrum, P.O. Box 10149, D-6900 Heidelberg, W. Germany). *Eur. J. Clin. Pharmacol.* 11(5):337-344; 1977.

The influence of genetic and environmental factors on the metabolism of a single p.o. dose of ethanol (1.2 ml/kg) was analyzed in 19 identical and 21 fraternal healthy, adult, un-selected male twins. The heritability values of the rates of absorption, degradation, and elimination of ethanol were 0.57, 0.41, and 0.46, resp. Environmental factors, such as daily alcohol intake and smoking, increased the rate of elimination of blood alcohol. Intrasubject variation in ethanol metabolism was studied by repeated tests in 11 male volunteers at intervals of at least 2 months, under the same conditions as in the twins; the coefficient of variation for parameters of metabolism was about 8%. The results demonstrate both genetic control of ethanol absorption, degradation, and elimination and the appreciable influence of environmental factors. The almost total genetic control of ethanol metabolism, which was postulated previously, could not be confirmed.

0021 ALTERATIONS IN THE ENDOPLASMIC RETICULUM AND GOLGI COMPLEX OF INTESTINAL EPITHELIAL CELLS DURING FAT ABSORPTION AND AFTER TERMINATION OF THIS PROCESS: A MORPHOLOGICAL AND MORPHOMETRIC STUDY.

(Eng.) Friedman, H. I.; Cardell, R. R. (Dept. Surgery, Letterman Army Inst. Res., Presidio of San Francisco, CA 94129). *Anat. Rec.* 188(1):77-102; 1977.

The morphological changes in the endoplasmic reticulum (ER) and Golgi complex during fat absorption and at successive time intervals after the termination of fat absorption were studied in male rats. Following the administration of corn oil by intubation, the smooth endoplasmic reticulum (SER) was seen to proliferate, and numerous vesicles contained reesterified lipid. The rough endoplasmic reticulum (RER) decreased, and 1 hr after fat administration, the RER only occupied a narrow zone interposed between the Golgi complex and the SER region. These findings were confirmed by morphometric analysis; the RER decreased from approximately 2.4 to 1.2 μ/μ^2 cytoplasm, while the SER increased from approximately 3.7 to 4.8 μ/μ^2 cytoplasm, from the fasted to the fat-fed state ($p<0.01$). The Golgi complex was seen to accumulate lipid in the Golgi vacuoles after fat administration. Lipid droplets did not occur in saccules near the forming face of the Golgi complex, and as the absorptive process continued, the length and number of Golgi saccules decreased significantly (by 0.74 μ of membrane/μ^2 cytoplasm) from the fasted state to 60 min after fat administration ($p<0.01$). The Golgi vacuoles increased by 0.32 μ of membrane/μ^2 cytoplasm ($p<0.01$). After the termination of fat absorption, using a saline flush, the RER progressively increased, and the quantity of SER lipid-containing vesicles decreased. The Golgi vacuoles decreased in number and size, while the saccules increased in length and number after the termination of fat absorption. The results support the suggestion that during fat absorption, membrane synthesis by the RER is insufficient to accomodate membrane utilization and intraconversion, resulting in a decrease of both ER and Golgi complex components. Following the termination of fat absorption, the cell is able to replace previously depleted components of the ER and Golgi complex and regain the full membrane complement of the fasted state. Replenishment of cellular membranes may result from a continued synthesis of new membranes by the RER, which eventually exceeds the amount membrane utilized during lipid transport.

0022 IRON ABSORPTION IN THE RAT: THE SEARCH FOR POSSIBLE INTESTINAL MUCOSAL CARRIERS.

(Eng.) Halliday, J. W.; Powell, L. W.; Mack, U. (Royal Brisbane Hosp., Brisbane 4029, Australia). *Br. J. Haematol.* 34(2):237-250; 1976.

The biological relevance of four iron-containing fractions previously detected in rat intestinal mucosal cells was studied. The distribution of iron in these fractions, obtained by chromatography on Sepharose 6B, was examined after *in vivo* and *in vitro* incubation of mucosal cells with ^{59}Fe. In addition, the effects of phenobarbitone, cycloheximide, iron-deficiency, and iron-loading on the uptake and distribution of iron within the four mucosal cell fractions was studied. The iron in fraction I was mostly bound to intracellular membrane particles. Fraction II was shown to be ferritin. Fraction III contained some transferrin and also a protein of molecular weight similar to transferrin, but which was not precipitable by antitransferrin antiserum. Under all experimental conditions (normal, iron-loaded, iron-deficient, phenobarbitone- and cycloheximide-treated animals) fraction I contained less ^{59}Fe in the *in vivo* than in the *in vitro* studies. In iron deficiency, the ^{59}Fe/protein ratio in fractions I and III was markedly increased, especially *in vivo*, and fraction II (ferritin) was not detectable either by agar gel diffusion or polyacrylamide gel electrophoresis. In iron-loaded animals, the ^{59}Fe/protein ratio was increased in fraction II. Cycloheximide treatment resulted in a decrease in the ^{59}Fe content of fraction I, but not in the other fractions. Phenobarbitone treatment produced no detectable change in any fraction. Quantitative differences between the *in vivo* and *in vitro* studies combined with the results of "chaser" experiments suggested that, in addition to ferritin, at least two fractions (I and III) were involved in the process of iron absorption by the mucosal cells.

0023 Na AND Cl TRANSPORT AND SHORT-CIRCUIT CURRENT IN RABBIT ILEUM.

(Eng.) Tai, Y. H.; Desjeux, J. F.; Danisi, G.; Curran, P. F. (Walter Reed Army Medical Center, Washington, DC 20012). *J. Membr. Biol.* 31(1/2):189-208; 1977.

Na and Cl fluxes and short-circuit current (I_{sc}) in rabbit ileum were studied as a function of ionic concentrations in HCO$_3$-free solutions. Both net Na flux (J^{Na}_{net}) and I_{sc} showed similar saturation functions of [Na] at fixed [Cl]. They showed no significant difference between 0 and 112 mM Na, but at 140 mM Na I_{sc} was significantly greater than the J^{Na}_{net}. Net Cl transport (secretion) was observed only at 140 mM Na and was approximately equivalent to the difference between the I_{sc} and J^{Na}_{net}. The transcellular mucosa-to-serosa Na fluxes measured at 140 and 70 mM Na did not differ significantly from the corresponding I_{sc}. The net Cl flux varied with [Cl] at fixed [Na], but I_{sc} was virtually not affected by [Cl]. These results suggest that the absorptive Na transport process is electrogenic and responsible for the I_{sc} and that the secretory fluxes of Na and Cl are coupled, require high [Na], vary with [Cl], and do not contribute to I_{sc}. A K-free solution abolished the I_{sc} after a prolonged lag. The intracellular Na and K concentrations did not vary significantly with anion concentration. All Cl-containing solutions gave approximately the same intracellular Cl concentration, but the Cl-free solutions gave about 10 mM inexchangeable or slowly exchangeable Cl.

0024 INHIBITION OF ION TRANSPORT BY BILE SALTS IN CANINE GASTRIC MUCOSA.

(Eng.) Kuo, Y. J.; Shanbour, L. L. (Univ. Texas Medical Sch., Houston, TX 77025). *Am. J. Physiol.* 231(5):1433-1437; 1976.

The effect of bile salts on ion transport was studied in *in vivo* and *in vitro* canine stomach preparations. The instillation of 5, 10, and 20 mM of bile salts in *N*-tris(hydroxymethyl)methyl-2-aminoethane sulfonic acid buffered to pH 7.4 by NaOH into the nonsecreting stomach *in vivo* caused a progressive decrease in electrical potential difference (PD) and an increase in electrical resistance (R). The rate of acid secretion, determined by the pH-stat method in the histamine-stimulated stomach, decreased with 5 and 20 mM of bile salts. Mucosal ATP content of the nonsecreting or secreting stomach was reduced by bile salts. *In vitro* flux studies demonstrated that within the first hour after 1 mM of bile salts were added to the mucosal side of the chamber, PD decreased, R increased, and net sodium transport decreased. In the second hour, unidirectional fluxes of sodium increased, indicating an increase in permeability of the gastric mucosa to sodium. These results demonstrate that the initial action of bile salts is inhibition of ion transport, which is followed by an increase in permeability.

0025 ABSORPTION OF AMINO PENICILLINS FROM EVERTED RAT INTESTINE. (Eng.) Dixon, C.; Mizen, L. W. (Beecham Pharmaceuticals, Brockham Park, Betchworth, Surrey, RH3 7AJ, England). *J. Physiol. (Lond.)* 269(3):549-559; 1977.

The absorption of the amino penicillins amoxycillin, ampicillin, cyclacillin, BRL 11792, BRL 10351, BRL 8033, BRL 8035, and BRL 7116 was studied in rat jejunum, using an *in vitro* everted gut sac method to identify the involvement of any specialized transport mechanisms in their absorption across the intestine. Only cyclacillin (1-amino-cyclohexyl penicillin) was shown to be actively transported. The other penicillins appeared to diffuse passively across the intestine. Cyclacillin was found to concentrate against a gradient at 37 C but not at 19 C. Transport of cyclacillin across the mucosal membrane was saturated at mucosal concentrations greater than 1,000 μg/ml. The rate of the forward flux of cyclacillin was many times that of its back flux, the latter being detectable only after 30 min. No relationship between the active transport of cyclacillin and that of amino acids could be demonstrated.

0026 ENERGY-RICH PHOSPHATES AND TRANSINTESTINAL TRANSPORT IN RAT INTESTINE INCUBATED IN VITRO AT DIFFERENT TEMPERATURES. (Eng.) Faelli, A.; Esposito, G.; Capraro, V. (Istituto di Fisiologia Generale e di Chimica Biologica, State Univ. Milan, Milan, Italy). *Biochim. Biophys. Acta* 455(3):759-766; 1976.

Tissue levels of ATP, ADP, and AMP were measured in everted rat jejunum incubated *in vitro* at 28 and 38 C for 1 hr and were compared with levels observed *in vivo* in unperfused (control) jejunum to investigate factors affecting intestinal fluid transport *in vitro*. Intestinal fluid transport values of 2.20 ± 0.24 and 0.98 ± 0.24 mg/g total dry weight intestine/hr were measured for intestines perfused *in vitro* for 1 hr at 28 and 38 C, resp.; these differences were significant ($p<0.01$). A comparison of wet/dry weight ratios of *in vitro* perfused intestinal mucosa scrapes and the remaining submucosa (at both incubation temperatures) with wet/dry weight ratios of *in vivo* unperfused control mucosa and submucosa revealed mucosal swelling under *in vitro* conditions at both temperatures ($p<0.01$ at 28 C and $p<0.001$ at 38 C); swelling was greater at 38 C. Additional fluid transport measurements made every 20 min during *in vitro* intestinal perfusion for 1 hr at 28 and 38 C revealed that fluid transport was constant throughout the 1-hr perfusion period at 28 C but progressively decreased with time at 38 C. ATP levels in total intestine and mucosal scrapes at the beginning of perfusion at 28 C were reduced from control (*in vivo*) values of 7.6 ± 0.6 and 6.7 ± 0.7 μmol/g, resp., to 3.7 ± 0.4 and 4.4 ± 0.3 μmol/g, resp. After 1 hr of perfusion at 28 C, these levels remained fairly constant, being 3.8 ± 0.3 and 3.8 ± 0.4 μmol/g, resp. However, ATP levels in total intestine and mucosal scrapes perfused at 38 C fell from values of 2.4 ± 0.4 and 1.9 ± 0.5 μmol/g, resp., recorded at the beginning of perfusion, to levels of 0.8 ± 0.1 and 0.4 ± 0.1 μmol/g, resp., after 1 hr of perfusion. A similar trend was seen for ADP. AMP levels under the above conditions did not vary appreciably. These results indicate that fluid transport and ATP content of *in vitro* perfused intestine are directly related. Transport activity, which is lower at 38 C than at 28 C, appears to be due to a low availability of energy-rich phosphates.

0027 ROLE OF 1,25-DIHYDROXYVITAMIN D_3 ON INTESTINAL PHOSPHATE ABSORPTION IN RATS WITH A NORMAL VITAMIN D SUPPLY. (Eng.) Rizzoli, R.; Fleisch, H.; Bonjour, J. P. (Dept. Pathophysiology, Univ. Berne, 3010 Berne, Switzerland). *J. Clin. Invest.* 60(3):639-647; 1977.

The question of whether changes in 1,25-dihydroxyvitamin D_3 [$1,25\text{-(OH)}_2D_3$] production can influence intestinal phosphorus transport in animals with a normal supply of vitamin D was investigated. The intestinal P absorption was evaluated in rats using both the *in situ* duodenal loop technique and the determination of the overall gastrointestinal absorption under three conditions known to influence the production of $1,25\text{-(OH)}_2D_3$: (a) variation in dietary P, (b) thyroparathyroidectomy (TPTX) with or without administration of parathyroid hormone (PTH), and (c) treatment with disodium ethane-1-hydroxy-1,1-diphosphonate (EHDP). In all circumstances, changes in duodenal absorption paralleled the changes in the overall fractional absorption. Lowering dietary P stimulated P absorption. TPTX decreased P absorption. This effect was corrected either by the administration of PTH or by the administration of $1,25\text{-(OH)}_2D_3$. EHDP, when given at a dose known to inhibit $1,25\text{-(OH)}_2D_3$ formation, decreased the duodenal P absorption in both intact and TPTX animals. This effect was corrected by $1,25\text{-(OH)}_2D_3$. In the TPTX-EHDP-treated animals, the administration of PTH did not rectify the low duodenal P absorption. These results support the thesis that, in rats with normal vitamin D supply, variations in the endogenous production of $1,25\text{-(OH)}_2D_3$ change the rate of P absorption. However, these changes are in such magnitude that they are of relatively small importance when compared to the effect of variation in the dietary intake of P. These results also strongly suggest that the action of PTH on duodenal P transport is mediated by its effect on $1,25\text{-(OH)}_2D_3$ production, inasmuch as the effect of the hormone is abolished after blocking the renal 1-hydroxylation with EHDP.

0028 CYCLIC AMP-DEPENDENT AMINO ACID UPTAKE IN INTESTINE--THE IMPORTANCE OF β-ADRENERGIC AGONISTS. (Eng.) Kinzie, J. L.; Grimme, N. L.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Biochem. Pharmacol.* 25(24):2727-2731; 1976.

Cyclic AMP (cAMP)-dependent stimulation of neutral and dibasic amino acid uptake by intestinal mucosa was investigated, using everted rat intestinal rings. β-Adrenergic receptor sites on the mucosal cell itself were implicated, since epinephrine and isoproterenol stimulated uptake *in vitro*, and this uptake was blocked by propranolol. Glucagon, vasopressin, and norepinephrine had no effect on tissue cAMP levels or on amino acid uptake, but cholera toxin given *in vivo* increased both parameters tested *in vitro*. Theophylline and isoproterenol caused an increase in cAMP levels in the villus tip cells, where these drugs also stimulated amino acid uptake. Neither drug increased cAMP in crypt cells. Thus, the cAMP-stimulated uptake of amino acids *in vitro* is a function of the villus tip cells. Moreover, when metabolic products, such as cAMP, are measured in whole intestinal mucosa, it cannot be assumed that the change is uniform throughout the tissue, but may involve only one type of cell on the intestinal villus.

0029 PROTEIN, DIPEPTIDE, AND AMINO ACID ABSORPTION IN THE YOUNG OF PROTEIN-DEPRIVED RATS. (Eng.) Zeman, F. J.; Fratzke, M. L. (Dept. Nutrition, Univ. California, Davis, CA 95616). *Pediatr. Res.* 11(9):972-977; 1977.

The quantitative effect of prenatal protein deficiency on protein, dipeptide, and amino acid transport was studied in Sprague-Dawley rats, and experiments were carried out to determine whether alterations in the absorption of these substances could be correlated with a decreased population of enterocytes or their reduced functional ability. Absorption was studied *in vivo* by infusing intestines of newborn and postnatal young of female rats (fed diets containing 4% or 24% casein during pregnancy) with 50 mM ^{14}C-labeled 1-aminocyclopentane-1-carboxylic acid (ACC), α-aminoisobutyric acid (AIB), glycyl-1-L-leucine (GL), or 8% ^{3}H-histidine-labeled casein in 5% glucose and physiologic saline. Casein absorption was significantly reduced per absorptive cell in prenatally protein-deprived (PPD) young at birth ($p<0.05$), but there were no differences at 8 days of age. AIB absorption and retention were decreased in PPD newborn young compared to controls, whether expressed as a total, on the basis of body weight, or per enterocyte. At 12 days, total retention and absorption were reduced in PPD young, but all other differences no longer existed. ACC absorption was reduced in PPD young, compared to controls, regardless of the means of expression. Retention of ACC per enterocyte was increased at birth compared to controls. These differences had disappeared by 8 days. GL retention was increased in PPD young compared to controls at birth, but not at 8 days. The data on casein absorption indicate that newborn PPD young are handicapped at some point in the processes of amino acid absorption and digestion and protein absorption. The high retention of dipeptide per enterocyte may be the consequence of a decreased ability of the enterocytes of PPD young to hydrolyze the dipeptide or may be the result of increased incorporation of these materials into mucosal protein. There is apparently a marked difference between the effects of intestinal absorption of prenatal protein deprivation and those of postnatal malnutrition. It is suggested that the competence of the enterocytes is reduced in newborn PPD young, whereas animals whose prenatal nutrition was normal begin life with a larger complement of fully differentiated absorptive cells and might therefore be capable of greater adaptation to the nutritional deficit.

0030 VITAMIN K$_2$ COLONIC AND ILEAL IN VIVO ABSORPTION: BILE, FATTY ACIDS, AND pH EFFECTS ON TRANSPORT. (Eng.) Hollander, D.; Rim, E.; Ruble, P. E., Jr. (Dept. Medicine, Wayne State Univ., Detroit, MI 48201). *Am. J. Physiol.* 233(2): E124-E129; 1977.

Colonic and ileal absorption of vitamin K$_2$ ([2-methyl-^{3}H]menaquinone-9) was investigated in the conscious rat, and the effects of the vitamin concentration, the thickness of the unstirred water layer, the concomitant presence of fatty acids, the intraluminal pH, and the intraluminal sodium taurocholate concentration on absorption were studied. When the absorption rate was plotted against the perfusate concentration, a linear relationship was found between these two parameters in the ileum and colon. The absorption rate of menaquinone by the ileum was increased as the bile salt concentration, degree of unsaturation of the added long-chain fatty acids, hydrogen ion concentration, and perfusate flow rates were increased. Colonic menaquinone absorption decreased as the bile salt concentration was increased. Menaquinone colonic absorption increased as the pH decreased, but no change was noted as the perfusion rate was increased. The present observations *in vivo*, coupled with prior observations *in vitro*, indicate that the absorption of menaquinone by the ileum and colon occurs by a passive diffusion process that is modified by variations in the perfusate bile salt concentration, the presence of unsaturated fatty acids, and the perfusate pH. The results indicate that the mammalian colon and terminal ileum can provide a constant source of vitamin K to aid hemostasis despite episodic lack of dietary vitamin K.

0031 SITE OF ACTION OF ACETYLCHOLINE IN REGULATING INTESTINAL EPITHELIAL ION TRANSPORT IN THE RAT [Abstract]. (Eng.) Browning, J. G.; Hardcastle, J.; Hardcastle, P. T.; Redfern, J. S. (Dept. Physiology, Sheffield Univ., Sheffield, England). *J. Physiol. (Lond.)* 270(1):78P-79P; 1977.

0032 COMPARATIVE METABOLISM OF BENORYLATE AND AN EQUIVALENT MIXTURE OF ASPIRIN AND PARACETAMOL IN NEONATE AND ADULT RABBITS. (Eng.) Davison, C.; Dorrbecker, B. R.; Edelson, J. (Sterling-Winthrop Res. Inst., Rensselaer, NY 12144). *Xenobiotica* 7(9):561-571; 1977.

0033 STUDIES ON THE ABSORPTION OF THIAMINE, RIBOFLAVIN AND PYRIDOXINE IN VITRO. (Eng.)

Meinen, M.; Aeppli, R.; Rehner, G. (Institut fur Ernahrungswissenschaft I, Justus Liebig-Universitat, Wilhelmstrasse 20, D-6300 Giessen, W. Germany). *Nutr. Metab.* 21(Suppl. 1):264-266; 1977.

0034 INFLUENCE OF GUMS ON INTESTINAL ABSORPTION. (Eng.) Forster, H.; Hoos, I. (Zentrum der Biologischen Chemie, Universitat Frankfurt, Theodor-Stern-Kai 7, D-6000 Frankfurt/Main, W. Germany). *Nutr. Metab.* 21(Suppl. 1):262-264; 1977.

0035 EFFECT OF SODIUM ON THE ACTIVE TRANSPORT OF SUGARS IN THE RAT. (Eng.) Beyer, R.; Forster, H. (Zentrum der Biologischen Chemie, Universitat Frankfurt, Theodor-Stern-Kai 7, D-6000 Frankfurt/Main, W. Germany). *Nutr. Metab.* 21(Suppl. 1): 259-261; 1977.

0036 INFLUENCE OF THE IMMUNE RESPONSE ON THE ABSORPTION OF PROTEIN FROM THE GUT. (Eng.) Seifert, J.; Ring, J.; Steininger, J.; Brendel, W. (Dept. Surgery, Univ. Munich, Nussbaumstrasse 20, D-8000 Munchen 8, W. Germany). *Nutr. Metab.* 21 (Suppl. 1):256-258; 1977.

0037 INFLUENCE OF FOOD AND DIET ON GASTROINTESTINAL DRUG ABSORPTION: A REVIEW. (Eng.) Welling, P. G. (Sch. Pharmacy, Univ. Wisconsin, Madison, WI 53706). *J. Pharmacokinet. Biopharm.* 5(4):291-334; 1977.

0038 CHANGES IN THE ORAL ABSORPTION CHARACTERISTICS IN MAN OF DIPOTASSIUM CLORAZEPATE AT NORMAL AND ELEVATED GASTRIC pH. (Eng.) Abruzzo, C. W.; Macasieb, T.; Weinfeld, R.; Rider, J. A.; Kaplan, S. A. (Hoffmann-La Roche Inc., Nutley, NJ 07110). *J. Pharmacokinet. Biopharm.* 5(4):377-390; 1977.

0039 INFLUENCE OF IONIC ENVIRONMENT ON INTESTINAL OXYGEN CONSUMPTION. (Eng.) Jackson, M. J.; Kutcher, L. M. (George Washington Univ. Medical Center, Washington, DC 20037). *Experientia* 33(8):1061; 1977.

0040 DIFFERENT RESPONSE OF THE BIRD AND MAMMAL INTESTINAL ACTIVE TRANSPORT TO CALCIUM. (Eng.) Bolufer, J.; Larralde, J. (Departamento de Fisiologia Animal, Universidad de Navarra, Pamplona, Spain). *Comp. Biochem. Physiol.* 58(1A):75-79; 1977.

0041 EVERTED RAT INTESTINAL SACS AS AN IN VITRO MODEL FOR ASSESSING ABSORPTIVITY OF NEW DRUGS. (Eng.) Chowhan, Z. T.; Amaro, A. A. (Syntex Res., Palo Alto, CA 94304). *J. Pharm. Sci.* 66(9):1249-1253; 1977.

0042 ABSORPTION AND METABOLISM OF CHLORINATED FATTY ACIDS AND TRIGLYCERIDES IN RATS. (Eng.) Cunningham, H. M.; Lawrence, G. A. (Health and Welfare Canada, Tunney's Pasture, Ottawa, Canada). *Food Cosmet. Toxicol.* 15(2):101-103; 1977.

0043 ABSORPTION STUDIES WITH THE ANTI-DIARRHOEAL AGENT ETHACRIDINE LACTATE IN LABORATORY ANIMALS AND MAN. (Eng.) Rising, T. J.; Fromson, J. M.; McEwen, J.; Johnson, P. (Hoechst Pharmaceutical Res. Lab., Walton Manor, Milton Keynes, Buckinghamshire, England). *Arzneim. Forsch.* 27(I, 4):872-878; 1977.

0044 SEGMENTAL DIFFERENCE IN TRANSMUCOSAL FLUID MOVEMENT AND GLUCOSE EFFECT ON DRUG ABSORPTION FROM RAT GASTROINTESTINAL TRACT. (Eng.) Kitazawa, S.; Ito, H.; Sezaki, H. (Kyoto Univ. Hosp., Kawara-cho Shogoin, Sakyo-ku, Kyoto, Japan). *Chem. Pharm. Bull.* 25(1):19-28; 1977.

0045 GI DRUG ABSORPTION IN RATS EXPOSED TO COBALT-60 γ-RADIATION III: IN SITU INTESTINAL ABSORPTION. (Eng.) Brady, M. E.; Hayton, W. L. (Coll. Pharmacy, Univ. Cincinnati, Cincinnati, OH 45221). *J. Pharm. Sci.* 66(5):680-683; 1977.

0046 RESORPTION OF VITAMIN B_1--XII. CHANGES IN THE RESORPTION AND THE PHOSPHORYLATION OF THIAMINE IN RATS IN RELATION TO AGE. (Eng.) Lazarov, J. (Inst. Animal Breeding, Kostinbrod, Bulgaria). *Exp. Gerontol.* 12(1/2):75-79; 1977.

0047 FACTORS INFLUENCING ABSORPTION AND EXCRETION OF DRUGS. VI. EFFECT OF SODIUM CHOLATE ON IN SITU RAT INTESTINAL ABSORPTION OF BUFORMIN. (Eng.) Kojima, S.; Hamada, C.; Tanaka, R. (Faculty Pharmaceutical Sciences, Kumamoto Univ., 5-1, Oehon-machi, Kumamoto, 862, Japan). *Chem. Pharm. Bull.* 25(6):1243-1248; 1977.

0048 SMALL INTESTINAL ABSORPTION OF METHYLENE BLUE IN RATS, GUINEA PIGS AND RABBITS. (Eng.) Watanabe, J.; Mori, K. (Faculty Pharmaceutical Sciences, Nagoya City Univ., 3-1, Tanabe-dori, Mizuho-ku, Nagoya, 467, Japan). *Chem. Pharm. Bull.* 25(6):1194-1201; 1977.

0049 ENHANCEMENT OF INTESTINAL SUGAR TRANSPORT BY RATS FED SUCROSE AS COMPARED TO STARCH. (Eng.) Reiser, S.; Hallfrisch, J.; Putney, J.; Lev, F. (Nutrition Inst., U.S. Dept. Agriculture, Beltsville, MD 20705). *Nutr. Metab.* 20(6):461-470; 1976.

0050 ENTEROHEPATIC CIRCULATION OF SODIUM SULISATIN AND ITS EFFECTS ON GLUCOSE ABSORPTION IN THE RAT. (Eng.) Moreto, M.; Gonalons, E.; Mylonakis, N.; Giraldez, A.; Torralba, A. (Facultad de Farmacia, Zona Universitaria de Pedralbes, Barcelona [14], Spain). *J. Pharm. Pharmacol.* 29(7):446-448; 1977.

See also, 0090, 0115, 0230, 0244, 0273, 0275, 0289, 0290, 0423.

MOTILITY

0051 LONGITUDINAL FORCE AND STRESS OF RAT'S ESOPHAGUS: AGE-RELATED CHANGES. (Eng.) Zabinski, M. P.; Biancani, P. (Dept. Internal Medicine, Yale Univ., New Haven, CT 06510). *Am. J. Physiol.* 232(6):E580-E583; 1977.

The esophageal length, force, and stress characteristics were studied in rats, and the effect of age on these parameters was investigated. The longitudinal force-length relationship was studied *in vitro* in three age groups: 1, 3, and 12 months. The length of maximum force development (MFD) occurred at 1.4-1.5 times the *in vivo* length for all age groups. The active force developed at MFD increased markedly with age. The difference in the active forces in the 3-month and 12-month age groups is due to differences in cross section, because the active stress of the esophagus in the longitudinal direction was found to be approximately equal for the two age groups. The active stress in the 1-month-old rats was lower than in the 3-month-old rats, suggesting an increased contractility of the esophagus with age in this period of development.

0052 ESOPHAGEAL PERISTALTIC FORCE IN MAN: RESPONSE TO MECHANICAL AND PHARMACOLOGICAL ALTERATIONS. (Eng.) Schoen, H. J.; Morris, D. W.; Cohen, S. (Hosp. Univ. Pennsylvania, Philadelphia, PA 19104). *Am. J. Dig. Dis.* 22(7):589-597; 1977.

Studies were carried out in eight healthy subjects to quantify human esophageal peristaltic force, to determine the factors that alter this force, and to evaluate the relationship between force and intraluminal pressure. Force was measured using a mercury-in-Silastic strain gauge. Simultaneous pressures were obtained through constantly infused open-tipped catheters. On separate days, a sphere of either 6.0-, 9.0-, or 13.0-mm diameter was attached to the strain gauge, and measurements were obtained at three esophageal levels. Studies were done (a) with the subject at rest, (b) while performing a Valsalva maneuver, (c) during the administration of bethanechol (0.1 mg/kg, s.c.), and (d) after atropine (0.01 mg/kg, i.v.). Peristaltic force increased directly with sphere size but inversely with distance from the lower esophageal sphincter. Intraluminal pressure did not change significantly with sphere size or at different levels of the esophagus. A Valsalva maneuver increased force and pressure significantly only in the distal esophagus. Bethanechol had no significant effect on force at any esophageal level, but atropine decreased force at each esophageal level and with each sphere size. The distal esophageal response to a Valsalva maneuver was lost following atropine. Intraluminal pressure was a good index of peristaltic force, providing sphere size and esophageal level remained unaltered. These studies suggest that esophageal peristaltic force may be altered by bolus size, extrinsic maneuvers that alter intraluminal pressure (Valsalva maneuver), and certain pharmacological agents.

0053 CALCIUM DEPENDENCE OF NEUROMUSCULAR EVENTS IN ESOPHAGEAL SMOOTH MUSCLE OF THE OPOSSUM. (Eng.) de Carle, D. J.; Christensen, J.; Szabo, A. C.; Templeman, D. C.; McKinley, D. R. (Univ. Hosp., Iowa City, IA 52242). *Am. J. Physiol.* 232(6):E547-E552; 1977.

The relationship between extracellular calcium concentration and resting active tension and nerve-mediated events in the sphincteric or esophagogastric junctional region was examined. Intramural nerves in smooth muscle strips from opossum esophagus were stimulated electrically to cause contractions of longitudinal body muscle, off responses of transverse body muscle, and relaxations of sphincter muscle. Krebs solution was modified by calcium removal, by strontium substitution for calcium, by adding magnesium (2.4-22.4 mEq/l), and by adding nitroprusside (10^{-7}-10^{-5} M). Longitudinal muscle contractions were abolished by calcium removal and by excess magnesium; they were unaffected by nitroprusside; strontium could not replace calcium. Off responses were abolished by calcium removal and by excess magnesium; they were depressed by nitroprusside; strontium effectively replaced calcium. Resting active tension in sphincter strips was partly reduced by calcium removal and by excess magnesium; it was abolished by nitroprusside; strontium could not replace calcium. Relaxations in sphincter strips were unaffected by all experimental conditions. Longitudinal contractions, off responses, and resting active tension of the sphincter represent different kinds of calcium activation of muscle. The excitatory nerves (which are cholinergic) in longitudinal muscle are calcium dependent, whereas the nerves that produce off responses may not be. The nerves that relax the sphincter are not calcium dependent.

0054 THE INFLUENCE OF THE CALCIUM ANTAGONIST FENDILINE ON TONE AND MOTILITY OF THE GUINEA PIG GUT SMOOTH MUSCLE AND THE cAMP AND cGMP CONCENTRATIONS OF THE ISOLATED TERMINAL ILEUM.

(Eng.) Sprugel, W.; Mitznegg, P.; Heim, F. (Pharmakologischen Instituts der Universitat Erlangen-Nurnberg, 8520 Erlangen, W. Germany). *Arzneim. Forsch.* 27(3):571-574; 1977.

The effect of *N*-(2-benzhydryl-ethyl)-*N*-(1-phenylethyl)-amine hydrochloride (fendiline) on smooth muscle tone was studied in the guinea pig gastrointestinal tract, and the interactions between this drug and calcium, cyclic AMP, cyclic GMP, and theophylline in the terminal ileum were examined. Fendiline decreased the smooth muscle tone elevated by K^+-induced depolarization. This effect was antagonized by the addition of extra-Ca^{++}. The muscle relaxation was dose-dependent and amounted to 45-90% after 1-5 μg/ml fendiline. Proportionally to this effect, the tissue concentration in cyclic GMP was decreased whereas cyclic AMP remained unchanged. After 54 μg/ml theophylline, the cyclic AMP level in the terminal ileum was increased significantly, whereas cyclic GMP did not change. Theophylline had no influence on the relaxing effect of 1 μg/ml fendiline. By contrast, the increase in cyclic AMP after theophylline was prevented by fendiline. These findings are explained by the antagonistic effect of fendiline to Ca^{++}, which activates the guanylate cyclase and inhibits the adenylate cyclase. Fendiline seems to prevent the binding of theophylline to guinea pig ileal phosphodiesterase.

0055 SHORT CIRCUIT CURRENT AND TOTAL CONDUCTANCE MEASUREMENTS ON RAT ILEUM.

(Eng.) Emilio, M. G.; De Jesus, C. H. (Centro de Biologia, Instituto Gulbenkian de Ciencia, Oeiras, Portugal). *J. Physiol. (Lond.)* 270(1):209-222; 1977.

To determine the effects of different sugar molecules (D-glucose, 3-*O*-methyl-D-glucose, and 3-deoxy-3-fluor-D-glucose) on short circuit current and total conductance of the intestine, these measurements were made in preparations of rat terminal ileum, using either the intact tissue or the isolated epithelium. An increase in both short circuit current and total conductance was detected when these sugars were used. The Km and Vm values for the increase in short circuit current with glucose exhibited Michaelis-Menten kinetics were 2.8 mM and 69 $\mu A/cm^2$, resp. The values were 7.7 mM and 37 $\mu A/cm^2$, resp., with 3-*O*-methyl-D-glucose, and 47.6 mM and -61.7 $\mu A/cm^2$ with 2-deoxy-D-glucose. It was possible to determine a linear relationship between the two variables and to study the kinetics of the interaction of glucose and 3-*O*-methyl-D-glucose with the sodium sugar carrier by using increasing concentrations of these substances. The increases in short circuit current and total conductance were also verified in isolated epithelium. Phlorizin (5×10^{-6}-10^{-5} M), or the withdrawal of glucose reversed the increase in short circuit current, but the total conductance remained unchanged. Increasing concentrations of 2-deoxy-D-glucose added to the mucosal bathing medium caused a decrease in short circuit current without changing the total conductance, either in preparations of intact ileum or in isolated epithelium.

0056 MECHANICAL PROPERTIES OF TAENIA COLI SMOOTH MUSCLE IN SPONTANEOUS CONTRACTION.

(Eng.) Price, J. M.; Patitucci, P.; Fung, Y. C. (Coll. Medicine, Univ. South Florida, Tampa, FL 33612). *Am. J. Physiol.* 233(1):C47-C55; 1977.

To determine the dependence of mechanical properties on the length of the tenia coli smooth muscle, the following mechanical tests were carried out in spontaneously contracting guinea pig tenia coli: isometric step stretch, isotonic step loading, and length-tension. Passive stress-strain tests were also performed. Information on spontaneous contraction was more readily obtained in isometric tests. In length-tension tests, each isometric contraction was analyzed on a phase plane, which is a representation of muscle stress, $\sigma(t)$, versus the rate of change of stress, $\sigma(t)$. The curve in the phase plane provided parameters for describing spontaneous contraction as a function of muscle length, L. The maximum active stress in a cycle of spontaneous contraction, $S(L)_{max}$, and the maximum rate of increasing active stress, $[S(L)]_{max}$, where shown to depend on L in the same way. Both parameters attained a maximum value (upper bound) at the same muscle length, L_{max}. When L was less than L_{max}, the minimum stress in a spontaneous contraction, $\sigma(L)_{min}$ was negligible. If L was greater than L_{max}, $\sigma(L)_{min}$ increased nonlinearly and was equal to the passive stress in an epinephrine-relaxed muscle. The results show that the ratio of $[S(L)]_{max}$ to $S(L)_{max}$ is constant for a physiological range of muscle length. This suggests that the ratio of $[S(L)]_{max}$ to $S(L)_{max}$ may be used as an index of contractility for tenia coli.

0057 PATTERNS OF GASTRIC ELECTRICAL AND MOTOR ACTIVITY IN MINIATURE PIGS.

(Eng.) Roze, C.; Couturier, D.; Debray, C. (Hopital Bichat, 170 Bd Ney, 75877 Paris, Cedex 18, France). *Can. J. Physiol. Pharmacol.* 54(5):764-773; 1977.

Electrical and motor gastric patterns were recorded with chronically implanted electrodes and strain gauge force transducers in fasted and fed miniature Pitman Moore pigs to determine the usefulness of this model for physiological and pharmacological research. The patterns of gastric myoelectrical activity in pigs were generally similar to those observed in dogs, including regular cyclic potential variations in the distal two-thirds of the gastric wall and spike response activity following pacesetter potentials (PP), which was associated with muscle contraction. In fasting animals the frequency and propagation velocity of PP in the distal stomach (<11 cm from the pylorus) ranged from 3.78 ± 0.129 to 4.66 ± 0.130 cycles/min and 4.9 ± 0.18 to 7.8 ± 0.31 mm/sec, resp. There was a significant ($p<0.001$) level of variance in these parameters between different animals studied and between sessions for each animal. The following electrical and motor activity patterns were found to be peculiar to the miniature pigs studied: conduction velocity of the PP was increased only moderately in the antrum compared with a fourfold increase for dogs; tachygastria never occurred in pigs; a slight and progressive increase in PP frequency was observed in response to a standard meal and lasted for 2-4 hr; meal-induced contractions were of large amplitude and proceeded immediately at the maximal contracting force of the stomach; and the periodic reinforcement of spiking that is characterized in dogs by the migrating electrical complexes was not observed. The 40-min period following the administration of a test meal appeared especially suitable for pharmacological or physiological experiments in which inhibitory factors on the stomach are tested.

0058 MEAN TRANSIT TIME OF SOLID TEST MEALS IN GASTRIC EMPTYING.

(Eng.) Aeberhard, P.; Steudler, G.; Noelpp, U.; Rosler, H. (Inselspital, CH-3010 Bern, Switzerland). *Digestion* 15(5):361-372; 1977.

Gastric emptying of a technetium-labeled test meal was studied in nine healthy volunteers using a gamma-camera with on-line computer. Mean transit time (MTT) was determined by fitting the time-activity histogram to a gamma-variate, and the half-time of emptying ($T_{1/2}$) was calculated by exponential fitting of the down slope of the time-activity curve. MTT showed a smaller coefficient of variance than $T_{1/2}$. This result suggests that MTT may be a more suitable parameter for definition of normal values and for the separation of normal from pathological patterns of emptying.

0059 THE ROLE OF THE EXTRINSIC ANTRAL NERVES IN THE REGULATION OF GASTRIC EMPTYING.

(Eng.) Mroz, C. T.; Kelly, K. A. (Mayo Medical Sch., Rochester, MN). *Surg. Gynecol. Obstet.* 145(3):369-377; 1977.

The hypothesis that extrinsic antral nerves enhance gastric emptying of solids both by initiating and strengthening the bursts of powerful contractions that occur periodically during fasting and by stimulating antral peristalsis and trituration during feeding was tested. In six conscious dogs with chronically implanted gastric and duodenal electrodes, gastric emptying of 40 radiopaque plastic spheres (7 mm diameter, specific gravity 1.6) was assessed fluoroscopically during fasting and after the feeding of boiled beef liver (25 g of 1-cm cubes). Gastric emptying of 400 ml of 154 mM sodium chloride marked with ^{14}C-polyethylene glycol was also measured. The extrinsic antral nerves were then transected, and after recovery, the tests were repeated. Before antral denervation, gastric spheres were emptied predominantly during activity fronts--the 5- to 15-min bursts of action potentials and contractions that sweep aborally from the stomach to the colon every 2 hr during fasting. Feeding abolished activity fronts for about 8 hr, and, therefore, delayed gastric emptying of the spheres. After antral denervation, antral activity fronts were irregular, less frequent, and of shorter duration, and the spheres emptied slower both during fasting and after feeding. In contrast, the emptying of isotonic sodium chloride was unchanged. It is concluded that antral extrinsic nerves enhance gastric emptying of solid spheres but not of isotonic sodium chloride.

0060 PROLONGATION OF GASTRIC EMPTYING BY ORAL PROPANTHELINE.

(Eng.) Hurwitz, A.; Robinson, R. G.; Herrin, W. F. (Univ. Kansas Medical Center, Kansas City, KS 66103). *Clin. Pharmacol. Ther.* 22(2):206-210; 1977.

The effect of a frequently used p.o. dose of propantheline bromide (30 mg) on gastric emptying of a radioisotope-labeled test meal was studied. In a prospective, double-blind, randomized crossover design, 13 normal subjects received propantheline or placebo 90 min before taking a 113m-indium-labeled liquid test meal, the volume of which was adjusted to body weight. The disappearance of radioisotope from the area of the stomach was determined by external gamma counting. After placebo, the mean half-emptying time was 68 min, and after propantheline it was 135 min ($p<0.005$). Although salivary flow decreased and pulse rate increased, there were no visual disturbances. This study demonstrates that a single 30-mg dose of propantheline bromide doubles the mean gastric half-emptying time in man.

0061 MYOELECTRICAL AND MECHANICAL ACTIVITY OF STOMACH AND INTESTINE IN HYPOTHYROID DOGS.

(Eng.) Kowalewski, K.; Kolodej, A. (Surgical-Medical Res. Inst., Univ. Alberta, Edmonton, Alberta T6G 2N8, Canada). *Am. J. Dig. Dis.* 22(3):235-240; 1977.

Myoelectrical activity was studied in normothyroid and hypothyroid dogs in the resting state, following injection of pentagastrin (6 µg/kg, i.m.) or bethanechol chloride (50 µg/kg, i.m.), or after feeding. Hypothyroidism was produced by total thyroidectomy and chronic treatment with thiouracil. Electrodes were surgically implanted over the serosa of the stomach, duodenum, jejunum, and ileum and used for repeated recording of myoelectrical activity of gastrointestinal muscles. A strain gauge was implanted over the gastric antrum, and served to record mechanical activity of the stomach. Compared with controls, hypothyroid animals showed decreased frequency of electrical control activity of the stomach (22% decrease, $p<0.01$) and jejunum ($p<0.01$), decreased occurrence of electrical response activity (spike potentials) following stimulation, and decreased mechanical response to the same stimulants, i.e., pentagastrin, bethanechol chloride, and food. The abnormalities in the motor activity of the gastrointestinal muscles in clinical and experimental thyroid deficiency may be due to metabolic and functional changes in the muscle cells.

0062 STIMULATORY (H_1) AND INHIBITORY (H_2) HISTAMINE RECEPTORS IN GALLBLADDER MUSCLE. (Eng.) Waldman, D. B.; Zfass, A. M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA 23298). *Gastroenterology* 72(5):932-936; 1977.

The nature of histamine receptors in guinea pig gallbladder muscle was examined using specific histamine-receptor agonists and antagonists. Metiamide (10^{-4}-10^{-3} M) augmented the contractile response to histamine, indicating that gallbladder muscle possessed stimulatory H_1 receptors and inhibitory H_2 receptors. The independent inhibitory character of H_2 receptors was confirmed by (a) induction of relaxation with histamine after H_1-receptor blockade and the suppression of this relaxation with metiamide, and (b) induction of relaxation with 4-methyl histamine, and the suppression of this relaxation with metiamide. Blockade of H_2 but not of H_1 receptors augmented the response to the octapeptide of cholecystokinin. The nature of this effect was such that the apparent affinity of the octapeptide for its own receptor was increased. The findings raised the possibility that, in their native unoccupied state, H_2 receptors may modify the response to hormonal agents.

0063 THE SIGNIFICANCE OF IN VITRO EXPERIMENTS FOR THE INVESTIGATION OF GASTROINTESTINAL MOTILITY. (Ger.) Jennewein, H. M.; Weiser, H. F. (Firma Boehringer Sohn, Pharmaforschung Biologie, 6507 Ingelheim am Rhein, W. Germany). *Z. Gastroenterol.* 15(3):161-166; 1977.

0064 RADIOLOGICAL STUDIES OF ESOPHAGEAL AND GASTRIC MOTILITY. (Ger.) Faust, H. (Kantonsspital Basel, CH-4031 Basel, Switzerland). *Z. Gastroenterol.* 15(3):175-184; 1977.

0065 RECORDING OF THE ELECTRICAL ACTIVITY OF THE STOMACH AND INTESTINE. (Pol.) Knapik, Z.; Jagielski, J.; Nowicki, G.; Lubczynska-Kowalska, W.; Cader, J.; Sajewicz, Z. (Z Kliniki Gastroenterologiczna Instytutu Chorob Wewnetrznych ul. Poniatowskiego 2, Wroclaw, Poland). *Pol. Tyg. Lek.* 31(42):1787-1790; 1976.

0066 GASTRIC AND INTESTINAL BIOPOTENTIAL RECORDING IN A CLINIC. (Rus.) Rebrov, V. G. (N. N. Burdenko Principal Military Hosp., USSR). *Klin. Med.* 55(2):24-30; 1977.

0067 CHARACTERISTICS OF THE SKIN ELECTROGASTROGRAPHY AND BALLOON MECHANOGRAPHY OF THE STOMACH MOTOR ACTIVITY. (Rus.) Galperin, Yu. M.; Rebrov, V. G.; Popova, T. S.; Gorin, A. S.; Oparin, V. S. (Sklifossofsky's First Aid Inst., Moscow, USSR). *Fiziol. Zh. SSSR* 62(11):1667-1675; 1976.

0068 THE GASTROINTESTINAL MYOELECTRICAL COMPLEX. (Ger.) Aeberhard, P. (Klinik fur viszerale Chirurgie, Inselspital, CH-3010 Bern, Switzerland). *Z. Gastroenterol.* 15(3):202-208; 1977.

0069 EFFECT OF CORTICOSTERONE, GLUCAGON AND GROWTH HORMONE ON GASTROINTESTINAL PROPULSIVE MOTILITY IN RATS. (Cze.) Visnovsky, P. (Katedra patologickej fyziologie a farmakologie ·LFUK Partizanska 19, 03753 Martin, Czechoslovakia). *Bratisl. Lek. Listy* 65(4):394-399; 1976.

0070 MOTOR FUNCTION OF THE DUODENUM IN CHILDREN, AS EVIDENCED BY X-RAYS. (Rus.) Filippkin, M. A. (Central Medical Advanced Training Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 21(9): 28-31; 1976.

0071 ON THE SPASMOLYTIC ACTION OF 3-BUTOXY-1-PHENOXY-PROPANOL-(2) (FEBUPROL) ON THE BILIARY TRACT. (Ger.) Eisenburger, R. (Klinge Pharma GmbH & Co., Postfach 40 04 20, D-8000 Munchen 40, W. Germany). *Arzneim. Forsch.* 27(II, 7):1429-1433; 1977.

0072 THE EFFECT OF ADRENAL INSUFFICIENCY ON GALLBLADDER MOTILITY. (Rus.) Potapov, A. A.; Potapova, Z. G.; Medvedev, M. A. (Medical Inst., Tomsk, USSR). *Fiziol. Zh. SSSR* 62(11): 1691-1697; 1976.

0073 THE INFLUENCE OF VAGOTOMY ON GALLBLADDER MOTILITY. (Rus.) Zhuk, A. M. (Surgical Clinic, S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 118(2):20-24; 1977.

See also, 0007, 0012, 0205, 0309, 0310, 0388, 0441, 0453, 0463.

0074 POTENTIAL AND LIMITATIONS OF ENZYME CYTOCHEMISTRY: STUDIES OF THE INTRACELLULAR DIGESTIVE APPARATUS OF CELLS IN TISSUE CULTURE. (Eng.) Hundgen, M. (Dept. Zoology, Univ. Bonn, Bonn, W. Germany). *Int. Rev. Cytol.* 48:281-321; 1977.

0075 EFFECT OF ELECTRICAL STIMULATION OF THE AUTONOMIC NERVES ON THE LEVELS AND SYNTHESIS OF CYCLIC NUCLEOTIDES IN THE RAT SALIVARY GLANDS: RELATIONSHIP TO ENHANCED GROWTH. (Eng.) Templeton, D.; Butcher, F. R.; Turner, C. J.; Muir, T. C.; Durham, J. P. (Dept. Pharmacology, Univ. Glasgow, Glasgow, Scotland). *J. Cyclic Nucleotide Res.* 3(2):107-118; 1977.

0076 COMPARTMENTATION OF ENZYMES IN THE RABBIT PAROTID SALIVARY GLAND. A STUDY BY ENZYME HISTOCHEMICAL, TISSUE FRACTIONATION AND MORPHOMETRIC TECHNIQUES. (Eng.) Pratten, M. K.; Williams, M. A.; Cope, G. H. (Dept. Human Biology, Univ. Sheffield, Sheffield, England). *Histochem. J.* 9(5):573-598; 1977.

0077 HISTOCHEMISTRY OF 11β-HYDROXYSTEROID DEHYDROGENASE IN RAT SUBMANDIBULAR GLAND. EFFECT OF CORTISOL STIMULATION. (Eng.) Hoyer, P. E.; Moller, M. (Lab. Cyto- and Histochemistry, Univ. Copenhagen, Universitetsparken 1, 2100 Copenhagen, Denmark). *Histochem. J.* 9(5):599-618; 1977.

0078 CHANGES IN THE ATP POOL OF PAROTID AND SUBMAXILLARY GLANDS OF RATS AFTER STIMULATION WITH ISOPROTERENOL. (Eng.) Capps, M. J.; Mooney, C. J.; Itzhaki, S. (Dept. Medical Biochemistry, Univ. Manchester, Stopford Bldg., Manchester M13 9PT, England). *Gen. Pharmacol.* 8(2):129-131; 1977.

See also, 0001, 0005, 0006, 0242, 0527, 0536.

SECRETION AND METABOLISM

Stomach

0079 GLYCOPROTEIN SYNTHESIS IN GASTRIC EPITHELIAL CELLS OF THE RAT. PROPERTIES OF MICROSOMAL GLYCOPROTEIN GLYCOSYLTRANSFERASES. (Eng.) Strous, G. J. A. M.; Kramer, M. F. (Dept. Histology Cell Biology, Univ. Utrecht, Nic. Beetsstraat 22, Utrecht, Netherlands). *Biochim. Biophys. Acta* 451(1):201-211; 1976.

The mechanism of the biosynthesis of the epithelial glycoproteins that line the inner surface of the mammalian stomach was investigated in tissue preparations from the Wistar rat. An assay method was devised for determining microsomal glycoprotein galactosyl- and fucosyltransferase in gastric scrapings, using both exogenous and endogenous glycoprotein. Subcellular fractionation of the homogenate yielded microsomal fractions that were high in the glycosyltransferases, with the probable location of fucosyltransferase on the rough endoplasmic reticulum and the galactosyltransferases on the Golgi apparatus. The amount of galactosyltransferase in the total cell homogenate was increased when studied after rats were starved for 48 hr and then permitted access to food for 3 hr (0.51 ± 0.034 nmol/min/μg DNA versus 0.65 ± 0.052 nmol/min/μg DNA, $p<0.01$). The endogenous acceptor molecule was identified as a glycoprotein.

0080 MOLECULAR FORMS OF GASTRIN IN THE ANTRAL MUCOSA. PLASMA AND GASTRIC JUICE DURING VAGAL STIMULATION OF ANESTHETIZED CATS. (Eng.) Unvas-Wallensten, K.; Rehfeld, J. F. (Karolinska Institutet, Stockholm, Sweden). *Acta Physiol. Scand.* 98(2):217-226; 1976.

Antral mucosa, blood, and gastric juice samples collected from anesthetized cats during electrical vagal stimulation were subjected to gel filtration to characterize the different molecular forms of gastrin. The gastrin concentration in the antral mucosa ranged from 2.82 to 3.60 μg/g mucosa, and the predominant gastrin form in antral mucosa was component III (gastrin-17), which accounted for about 94% of the total immunoreactivity. The antrum also contained 5% component II (gastrin-34) and 1% component I gastrin as well as trace amounts of component IV (gastrin-14). The gastrin concentration in the gastroduodenal vein (mainly draining the antrum) at 30-60 min after the start of vagal stimulation was as high as 12,400 pg/ml. Immediately after vagal stimulation, component III gastrin appeared in the gastric venous effluent followed within a few minutes by component IV gastrin. Component I or II gastrin was not detectable in plasma samples. It is suggested that component III gastrin is released from the antral mucosa and is then rapidly metabolized to component IV gastrin, possibly to a significant extent in the fundic region of the stomach. Gastrin levels of approximately 45,000 pg/ml were found in some gastric juice samples that contained large amounts of component III. Only very small amounts of immunoreactive degradation products were present in gastric juice, indicating that cat gastrin is relatively resistant to peptic degradation and acid hydrolysis.

0081 CHARACTERIZATION OF AN ADENYLATE CYCLASE SYSTEM SENSITIVE TO HISTAMINE H_2-RECEPTOR EXCITATION IN CELLS FROM DOG GASTRIC MUCOSA.

(Eng.) Scholes, P.; Cooper, A.; Jones, D.; Major, J.; Walters, M.; Wilde, C. (Imperial Chemical Industries Ltd., Pharmaceuticals Div., Mereside, Alderley Park, Macclesfield, Cheshire SK 10 4TG, England). *Agents Actions* 6(6):677-682; 1976.

The effect of histamine on the cyclic AMP level was investigated in canine gastric mucosal cells. Cyclic AMP in these cells was elevated by histamine and 4-methyl histamine, but 2-methyl histamine was only a weak agonist. The effects on cyclic AMP levels were inhibited competitively by metiamide and burimamide, which gave apparent K_B values of 3.5×10^{-7} M and 2.3×10^{-6} M, resp. These values are similar to those reported for other histamine H_2-receptor systems. The H_1-receptor antagonists, mepyramine and chlorpheniramine, had no inhibitory effect on the histamine-induced elevation of cyclic AMP; promethazine inhibited the system, but not by a competitive mechanism. It is concluded that the histamine-stimulated adenylate cyclase system is probably located in the parietal cell component.

0082 EFFECT OF ATROPINE AND METHIAMIDE ON VAGALLY INDUCED GASTRIC ACID SECRETION AND GASTRIN RELEASE IN ANESTHETIZED CATS.

(Eng.) Uvnas-Wallensten, K.; Andersson, H. (Karolinska Institutet, Stockholm, Sweden). *Acta Physiol. Scand.* 99(4):496-502; 1977.

The response of vagally-stimulated gastric acid secretion and gastrin release to atropine and methiamide was investigated in anesthetized cats. The vagal nerves, cut in the cervical region, were electrically stimulated (7 V, 2-5 msec, 2-10 Hz) for 1-3 hr to study gastric acid secretion or 5 or 10 min to study gastrin release. Atropine (0.1-0.3 mg/kg) or methiamide (4, 10, and 20 mg/kg) was administered 30-60 min after the beginning of electrical stimulation, and mean acid output was calculated before (last 15 min) and after (first two 15-min periods) the drug administration. To study gastrin release, atropine (0.1-2 mg/kg) or methiamide (20 mg/kg) were administered 15 min after the first and 10 min prior to the second electrical stimulation. Atropine reduced vagally stimulated gastric acid secretion approximately 40 and 30% of control values in the first and second 15-min periods following drug administration, resp. Methiamide reduced gastric acid secretion to about 30 and 10% of control values in the first two 15-min periods after drug administration. Gastrin release was not reduced by either drug. Possible explanations for the insensitivity of vagally induced gastrin release to atropine are discussed. It is suggested that the insensitivity of the neuroeffector junctions at the antral G cells to atropine and methiamide may be due to the presence of noncholinergic fibers stimulating the antral G cells or to nonmuscarinic cholinergic receptors.

0083 EFFECT OF HISTAMINE H_2 ANTAGONISM BY METIAMIDE ON THE RESPONSE OF THE CANINE GASTRIC MUCOSA TO ACID AND BILE SALT.

(Eng.) Gurll, N. J.; Zinner, M. J.; Callahan, W. (Walter Reed Army Inst. Res., Washington, DC). *Gastroenterology* 73(2):255-259; 1977.

To clarify the effect of histamine H_2-receptor antagonists on gastric mucosa damaged by acid or acid plus sodium taurocholate, the effects of i.v. metiamide infusion on three characteristics of the gastric mucosa (the ionic fluxes of Na^+ and H^+, transmural potential difference [PD], and protein loss into the gastric lumen) were determined in five awake mongrel dogs. Denervated Heidenhain (fundic) pouches were prepared in the dogs, and antrectomy was performed followed by gastroduodenostomy. Experiments began 3 weeks later, and each dog was tested once a week for 2 months. The pouch lumen was perfused with 70 ml of either 80 mM HCl plus 80 mM NaCl (ATS) or ATS plus 20 mM sodium taurocholate (BS) for 3 hr at 37 C. Metiamide or 0.9% NaCl was infused i.v. at 10 µmol/kg/hr, beginning 30 min prior to perfusion of the pouch. Each dog was tested twice with each of the four possible combinations of agents. Exposure to ATS produced increases in the Na^+, Cl^-, and K^+ outputs, as well as in the luminal volume. During exposure to ATS, metiamide increased the mean H^+ clearance rate from -0.5 ± 0.5 to -1.9 ± 0.5 ml/30 min ($p<0.05$), but did not affect the PD, ion fluxes, or luminal volume. Exposure to BS increased the net Na^+ flux threefold and the K^+ gain by fourfold, in addition to increasing the volume and H^+ clearance rate. Metiamide infusion did not significantly alter the total mean H^+ clearance rate or ion fluxes during exposure to BS. The mean hourly net H^+ loss was significantly increased ($p<0.05$) by metiamide during the first 2 hr of exposure to BS even though H^+ concentration and PD were not affected. In addition, Cl^- gain was much lower than control values (BS alone) during the second and third hours, suggesting that acid secretion was reduced; this finding may also explain the increase in H^+ loss.

Metiamide infusion reduced the protein loss during exposure to BS in three of five dogs from >50 mg/3 hr to <20 mg/3 hr. These observations suggest that histamine may mediate gastric mucosal damage, particularly that resulting from exposure to BS.

0084 METIAMIDE AND STIMULATED ACID SECRETION FROM THE ISOLATED NON-DISTENDED AND DISTENDED MOUSE STOMACH.

(Eng.) Wan, B. Y. C. (Univ. Coll. London, Gower St., London WC1E 6BT, England). *J. Physiol. (Lond.)* 266(2):327-346; 1977.

The action of metiamide on the acid secretory response to various gastric stimuli in the perfused, isolated, distended, or nondistended mouse stomach was investigated. The distended stomach gave a marked and dose-related acid secretory response to histamine (HA, 10^{-6}-10^{-3} M), pentagastrin (PG, 10^{-8}-10^{-5} M), acetylcholine (5 x 10^{-5}-10^{-5} M), eserine (10^{-5}-10^{-3} M), or dibutyryl cyclic AMP (dbcAMP, 5 x 10^{-5}-10^{-3} M). In the nondistended stomach, dbcAMP regularly stimulated acid secretion in a dose-dependent manner; HA, PG, or acetylcholine did not always stimulate acid secretion. HA or PG, but not acetylcholine, always caused significant stimulation of acid secretion from the nondistended stomach in the presence of a phosphodiesterase inhibitor such as caffeine, theophylline, or the I.C.I. compound, 63197. At 10^{-4} M, these phosphodiesterase inhibitors markedly potentiated the stimulatory effect of HA or PG on acid secretion, and the order of effectiveness was 63197>theophylline>caffeine. 63197 Potentiated HA- or PG-stimulated acid secretion in the distended stomach markedly. Metiamide (5 x 10^{-5}-10^{-4} M) did not antagonize stimulation of acid secretion by dbcAMP in the nondistended or distended stomach. In the distended stomach, metiamide (5 x 10^{-5} M) significantly inhibited HA-stimulated acid secretion with a linear and parallel displacement of the HA dose-response curve to the right. Although at this concentration metiamide did not depress the maximal acid secretory response to HA, it markedly reduced the maximal acid secretory response attainable with PG. In the distended stomach, metiamide (5 x 10^{-5} M) did not inhibit acetylcholine-induced acid secretion significantly. Atropine (5 x 10^{-6} M) abolished the stimulatory effect of acetylcholine; it also inhibited PG-stimulated acid secretion, but it had little effect on acid secretion induced by HA. The results indicate that metiamide inhibits HA-induced acid secretion by competitive antagonism of the HA H_2-receptor, but its inhibitory effect on PG-induced acid secretion seems to be of a noncompetitive nature. The failure of metiamide to inhibit acid secretion induced by dbcAMP suggests that cAMP might regulate gastric acid secretion at a site beyond the H_2-receptor activation. The present results support the hypothesis that cAMP may be involved in HA-induced acid secretion in the isolated mouse stomach.

0085 EFFECT OF HISTAMINE ON TECHNETIUM-99m EXCRETION BY GASTRIC MUCOSA.

(Eng.) Wine, C. R.; Nahrwold, D. L.; Rose, R. C.; Miller, K. L. (Milton S. Hershey Medical Center, Hershey, PA 17033). *Surgery* 80(5):591-594; 1976.

The effects of histamine on ^{99m}technetium (Tc) pertechnetate (TcP) excretion by denervated antral and oxyntic gland mucosa were studied in four dogs prepared with a separated denervated antral pouch and a Heidenhain pouch and fasted for 18 hr prior to secretory studies. After an infusion of 0.15 M sodium chloride for two 15-min periods, histamine dihydrochloride (0.01, 0.02, or 0.16 mg/kg/hr) was constantly infused for twelve 15-min periods. After histamine had been infused for four 15-min periods, the dogs received a single rapid i.v. injection of TcP (0.9-1.6 mCi). All histamine doses caused a significant increase in Heidenhain pouch acid output that plateaued within 1 hr after the start of histamine infusion. Acid output was not affected by the TcP injection. Heidenhain pouch TcP output increased with increasing histamine doses. Peak TcP output (about 13 μCi/15 min) occurred at 30 min after a 0.16 mg/kg/hr histamine treatment and gradually declined thereafter. Peak TcP output (about 7 μCi/15 min) with a 0.02 mg/kg/hr histamine dose also occurred at 30 min after the start of histamine infusion, but the output remained at about the same level thereafter. With a histamine dose of 0.01 mg/kg/hr, there was a gradual increase in TcP output that reached about 6 μCi/15 after 2 hr of histamine infusion. When the mean total 2-hr TcP output was plotted against the mean 2-hr volume or acid output of gastric juice from Heidenhain pouches, a linear relationship was found in each case. Antral pouch secretion studies revealed no significant differences in pH, antral secretion volume, or antral pouch TcP output at different histamine doses. The maximum mean 2-hr TcP output from antral pouches (7.9 ± 0.9 μCi/2 hr) obtained with the highest histamine dose was less than one-third of the mean 2-hr output from Heidenhain pouches (26.6 μCi) obtained with the lowest histamine dose. The results suggest the possibility that TcP scanning accuracy in Meckel's diverticulum might be improved by the administration of histamine prior to TcP injection.

0086 EFFECT OF CALCITONIN ON GASTRIC SECRETION.

(Eng.) Yonaga, T.; Nakamura, K.; Matsuura, K. (Teikyo Univ. Sch. Medicine, Kaga 2-11-1, Itabashi-ku, Tokyo 173, Japan). *Proc. Jpn. Acad.* 52(9):532-535; 1976.

The mechanism of action of calcitonin (CT) on gastric secretion in rats with chronic gastric fistulas was investigated. The relation between CT action and serum calcium level was also studied in rats given an infusion of histamine (1 mg/hr) and calcium gluconate (2.5 mg/hr). Volume and acid and pepsin concentrations were measured in samples of gastric secretion collected every 30 min from rats injected s.c. with synthetic salmon CT (1 or 5 IU) dissolved in 1% acetic acid. Prior to the CT injection, rats had received saline alone (1.6 ml/hr infused through tail vein), saline infusions containing a stimulant of gastric secretion (histamine, 1 mg/hr; tetragastrin, 0.8 μg/hr; or bethanechol chloride, 20 μg/hr), or 2-deoxy-D-glucose (20 mg/rat), which is thought to stimulate the vagus nerve. Results revealed that CT completely inhibited stimulated and nonstimulated gastric secretion, although the degree of inhibition varied under different conditions. Gastric acid and pepsin secretions stimulated with histamine and calcium gluconate infusions were also inhibited by s.c. CT administration, indicating that the effect of CT on gastric secretion is independent of serum calcium levels.

0087 RELATIONSHIP OF THE GASTRIN RESPONSE TO THE AMOUNT OF FOOD INGESTED IN NORMAL SUBJECTS. (Eng.) Woussen-Colle, M. C.; Willems, G.; De Graef, J. (Hospital Saint-Pierre, Brussels, Belgium). *Digestion* 15(4):322-328; 1977.

The effect of the quantity of food ingested on the gastrin response was studied in eight normal subjects who received three different amounts of the same meal. The subjects received a meal that included 150 g of steak on one occasion, and on two other occasions one-half or twice this amount, resp. The peak gastrin response was similar for the three meals, but the integrated gastrin response was larger with the largest meals. A comparison of the response to the two largest meals indicated that in a given subject, the gastrin response is similar when tested on different occasions. A good correlation was found between individual fasting concentrations of gastrin and peak gastrin levels after feeding but not between basal gastrin and the integrated gastrin response. This finding could indicate that in normal subjects, the first two parameters are primarily related to the same control mechanisms (possibly the G cell mass), while the integrated gastrin response reflects the effectiveness of the feedback mechanisms controlling gastrin release.

0088 RESERPINE, CATECHOLAMINES AND VAGOTOMY IN THE RAT GASTRIC MUCOSA. AN ELECTRON MICROSCOPIC STUDY. (Eng.) Nyhus, L. M.; Kalahanis, N. G.; Das Gupta, T. K. (Abraham Lincoln Sch. Medicine, Chicago, IL). *Chir. Gastroenterol.* 10(4): 359-365; 1976.

The effects of reserpine on the enterochromaffin-like (ECL) cells of the rat fundic mucosa were examined. Fundic mucosa from control and reserpine (2.5 mg/kg x 2 days, i.p.)-treated animals was examined ultrastructurally. Reserpine caused an increase in the synthesis and release of ECL cell catecholamines. The increased local release of catecholamines may account for the ulcerogenic properties of reserpine. Previous studies have shown that vagotomy depletes the ECL cells of their granular content with no simultaneous increase in its synthesis; this effect may be one of the mechanisms whereby vagotomy prevents ulcer formation in reserpine-treated rats.

0089 EFFECT OF LYSINE-ACETYLSALICYLATE ON SERUM GASTRIN LEVELS. (Eng.) Estler, C. J.; Mitznegg, P.; Domschke, W.; Demling, L. (Dept. Pharmacology, Univ. Erlangen-Nurnberg, Universitatssr. 22, D-8520 Erlangen, W. Germany). *Acta Hepatogastroenterol.* 24(1):52-54; 1977.

The effect of lysine-acetylsalicylate (LAS) on serum gastrin levels was investigated in mice. Intragastrically administered LAS did not alter serum gastrin values, while a very high dose of LAS (450 μg/g) caused a short-lived, significant increase in serum gastrin (74.3 ± 17.1 versus 36.9 ± 7.6 pg/ml in controls, $p \leq 0.05$) when administered i.v. These results are consistent with the view that salicylates do not owe their potential ulcerogenic properties to stimulation of the gastrin-gastric secretion mechanism.

0090 PARIETAL CELLS OF THE STOMACH TRAP SALICYLATES DURING ABSORPTION. (Eng.) Brune, K.; Schweitzer, A.; Eckert, H. (Biocenter, Klingelbergstrasse 70, CH-4056, Basel, Switzerland). *Biochem. Pharmacol.* 26(18):1735-1740; 1977.

Autoradiographic methods were used to study the uptake of salicylates by the parietal cells in the stomach of rats. Whole-body autoradiographs taken 45 min after the administration of the ^{14}C-salicylic acid (10 μCi) showed activity in the kidneys and stomach wall but not in the stomach lumen or gut. Additional studies of thin slices of the stomach wall removed 1, 5, and 15 min after ^{3}H-salicylic acid administration indicated very rapid diffusion of the drug across the gastric wall in the glandular stomach. A method was devised for the rapid fixation of both the tissue and drug for autoradiography (immediate deep freezing of stomach wall in liquid propane, cutting in a cryostat at -25 C, mounting on emulsion and exposure at the same temperature). High drug concentrations were observed throughout the glandular stomach, but particularly in the parietal cells within 1 min of drug administration, indicating selective trapping of salicylate molecules by parietal cells. It is hypothesized that decay of the parietal cells is initiated by the salicylate immediately, and ulcers may be the ultimate outcome of this process. Results support the assumption that functioning parietal cells are essential for the development of ulcers due to salicylate medication, which would explain why achlorhydric patients rarely experience gastric side-effects from aspirin.

0091 THE EFFECT OF SEROTONIN ON PEPSIN INHIBITION BY DUODENAL FAT. (Eng.) Wazna, M. F.; Stein, T.; Wise, L. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY 11040). *Ann. Surg.* 186(2):130-135; 1977.

The role of serotonin in pepsin secretion was studied in dogs. Twelve female mongrel dogs were prepared with a Heidenhain pouch and gastric and duodenal cannulae. The purpose of the gastric cannulae was to divert stomach acid from the duodenum to prevent inhibition of gastric secretion during the experiment. Pretreatment with reserpine (0.1 mg/kg, i.m.)

abolished the stimulatory effect of histamine (0.04 mg/kg/hr) on pepsin secretion, while pretreatment by 1-methyl-d-lysergic acid butanolamide (2 mg/hr, i.v.) increased the pepsin inhibition resulting from the intraduodenal infusion of corn oil emulsion. 5-Hydroxytryptophan (20 mg/kg, i.v.) injected simultaneously with the intraduodenal corn oil caused marked increase in pepsin secretion. Since these effects were observed in the denervated Heidenhain pouch, it is suggested that serotonin acts directly as a hormone on gastric chief cells.

0092 PRINCIPAL REGULATORY FACTORS OF GASTRIC ACID SECRETION. (Ita.) Crema, A.; Frigo, G. M. (Istituto di Farmacologia Medica dell'Universita, Piazza Botta 10, 27100 Pavia, Italy). *Minerva Med.* 68(5):319-329; 1977.

0093 ENTERAL OXYGENATION AND ACID FORMING GASTRIC FUNCTION. (Rus.) Anisimov, A. V.; Erdeli, V. V. (Gorkii Medical Inst., Gorkii, USSR). *Vrach. Delo* (2):105-106; 1977.

0094 HYDROCHLORIC ACID SECRETION BY THE GASTRIC MUCOSA OF THE RAT FETUS. (Fre.) Geloso, J. P.; Garzon, B.; Vassout, P. (Laboratoire de Physiologie animale, Universite Paris 7, Bat. L, 2, place Jussieu, 75005 Paris, France). *C.R. Acad. Sci.* [*D*] *(Paris)* 285(10):1209-1211; 1976.

0095 INHIBITORY EFFECT OF AN H_2 RECEPTOR ANTAGONIST OF HISTAMINE (CIMETIDINE) ON GASTRIC SECRETION [Abstract]. (Fre.) Toulet, J.; Amrani, N.; Parmentier, T.; Bose, F.; Etcheverry, M.; Kerdiles, R.; Rousset, N. (Hopital International, Universite de Paris, 42, boulevard Jourdan, 75014 Paris, France). *Gastroenterol. Clin. Biol.* 1(5): 489-490; 1977.

0096 PENTAGASTRIN, HISTAMINE AND ASCORBIC ACID IN RAT GASTRIC MUCOSA. (Fre.) Gairard, A.; Pestis, J. (Laboratoires de Physiologie, UER des Sciences Pharmaceutiques ULP, 3 rue de l'Argonne, F-67083 Strasbourg Cedex, France). *Experientia* 33(4):457-458; 1977.

0097 INHIBITING ACTION OF TRITHIOZINE (ISF 2001) AND PROPANTHELINE ON HUMAN GASTRIC SECRETION. DOUBLE-BLIND CROSS-OVER STUDY. (Ita.) Bianchi Porro, G.; Ferrara, A.; Petrillo, M.; Abbondati, G. ("L. Sacco" Hosp., Milan, Italy). *Minerva Gastroenterol.* 22(2):149-152; 1976.

0098 INVESTIGATION OF THE THEORETICAL AND PRACTICAL PROBLEMS POSED BY RECENT KNOWLEDGE OF GASTRIN. (Fre.) Bonfils, S.; Bernades, P. (Hopital Bichat, 170, boulevard Ney, F 75877, Paris Cedex 18, France). *Nouv. Presse Med.* 5(35):2317-2321; 1976.

0099 THE EFFECT OF BLOCKING THE CHOLINOREACTIVE SYSTEMS ON THE APPEARANCE OF "STRESS" AND "STEROID" ULCERS OF THE STOMACH. (Rus.) Berger, E. N.; Bondarenko, Yu. I.; Rosolovsky, A. P. (Ternopol Medical Inst., Ternopol, USSR). *Patol. Fiziol. Eksp. Ter.* (1):29-32; 1976.

0100 PHARMACOLOGICAL STUDIES ON THE EFFECTS OF NEW PIPERAZIN DERIVATIVES AND SELECTED DRUGS ON EXPERIMENTAL GASTRIC ULCER. (Pol.) Malecki, I. (Instytut Przemyslu Farmaceutycznego, ul. Rydgiera 8, 01-793 Warsaw, Poland). *Pol. Tyg. Lek.* 31(42):1811-1813; 1976.

0101 INFLUENCE OF PYLORIC STENOSIS ON THE GENESIS OF STRESS ULCER IN THE RAT. (Ger.) Schramm, H.; Rupprecht, H.; Schafer, F. (Chirurgische Universitatsklinik, Bachstrasse 18, DDR-69 Jena, E. Germany). *Z. Exp. Chir.* 10(2):75-78; 1977.

0102 INFLUENCE OF PROSTAGLANDIN E_2 ON THE ACID-FORMING FUNCTION OF THE STOMACH AND ON ULCER FORMATION. (Rus.) Kochina, E. N.; Tsvetkova, L. I.; Grebeneva, L. S.; Polozhenkova, L. A.; Grebenev, A. L. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Patol. Fiziol. Eksp. Ter.* (3):60-62; 1977.

0103 GASTRIC SECRETION IN RATS WITH PYLORIC LIGATION PERFORMED ACCORDING TO EITHER SHAY'S OR DAI'S METHOD. (Spa.) Cannata, B.; Figueroa, E.; Aguero, E.; Peralta, H.; Suarez, J. R. E. (Facultad de Ciencias Medicas, Universidad Nacional de Cuyo, Venezuela). *Acta Gastroenterol. Latinoam.* 7(1):43-46; 1977.

0104 ROLE OF THE NERVOUS SYSTEM AS A POSSIBLE TRIGGER MECHANISM IN THE PATHOGENESIS OF EXPERIMENTAL GASTRIC ULCERS. (Rus.) Shekhtman, V. M. (Orenburg Medical Inst., Orenburg, USSR). *Patol. Fiziol. Eksp. Ter.* (4):45-48; 1977.

0105 HORMONAL AND NERVOUS CONTROL OF ELECTRICAL AND MECHANICAL FUNCTIONS OF ISOLATED STOMACH. (Pol.) Zajac, S.; Kowalewski, K. (Acad. Medicine, Warsaw, Poland). *Pol. Przegl. Chir.* 49(7):683-690; 1977.

0106 DIGESTIVE PROCESS OF POTATO STARCH GRANULES IN RAT ALIMENTARY TRACT. (Jpn.) Tada, H.; Kawai, F. (Faculty Nutrition, Koshien Univ., Takarazuka, Hyogo, Japan). *J. Jpn. Soc. Food Nutr.* 30(1):15-21; 1977.

See also, 0124, 0217, 0231, 0251, 0259, 0262, 0265, 0267, 0268, 0269, 0281, 0369, 0374, 0377, 0380, 0350, 0362.

Pancreas

0107 PANCREATIC ACINAR CELLS: LOCALIZATION OF ACETYLCHOLINE RECEPTORS AND THE IMPORTANCE OF CHLORIDE AND CALCIUM FOR ACETYLCHOLINE-EVOKED DEPOLARIZATION. (Eng.) Iwatsuki, N.; Petersen, O. H. (Dept. Physiology, Univ. Dundee, Dundee DD1 4HN, Scotland). *J. Physiol. (Lond.)* 269(3):723-733; 1977.

Acetylcholine (ACh) receptors were localized in pancreatic acinar cells, and the importance of chloride and calcium for ACh-evoked depolarization was studied. Intracellular microelectrode recordings of acinar cell membrane potential and resistance were made from the mouse pancreas superfused *in vitro*. The acinar cells were stimulated by microiontophoretic ACh application from an extracellular AChCl-filled microelectrode. Passing short-lasting ejecting current pulses through the AChCl-electrode caused acinar cell depolarization when the electrode was in an extracellular position not far (<50 μm) from an acinus impaled by a KCl microelectrode. After the insertion of the AChCl electrode into a neighboring acinar cell, electrically coupled to the acinar cell already impaled by the KCl-electrode, ejecting ACh current pulses only affected the membrane potential in a direct electrical manner, whereas there was no sign of an effect of ACh on the membrane potential. Replacing extracellular chloride by sulfate caused a marked increase in the amplitude of the ACh-evoked depolarization. If the membrane potential was recorded with a KCl electrode, ACh continued to evoke very large depolarizations even after more than 1 hr exposure to Cl-free solution. If the membrane potential was recorded with a K-citrate electrode, the effect of Cl-removal was only transient. Removal of Na^+ during exposure to Cl-free solution reduced the amplitude of the ACh-evoked depolarization. Readmission of Cl after more than 1 hr of Cl deprivation caused an immediate reversal of the ACh effect into a hyperpolarization. Removal of extracellular Ca^{2+} caused a marked reduction in the amplitude of small depolarizations evoked by just suprathreshold doses of ACh, whereas there was very little effect on larger depolarizations evoked by maximal or supramaximal ACh ejections. The effect of Ca removal was fully reversible. The addition of Mn after Ca-deprivation was as efficient as Ca in restoring normal electrophysiological responses to small doses of ACh. The acinar cell membrane seems only to be responsive to ACh added to the extracellular side, and ACh probably causes an increase in membrane Cl permeability in addition to the previously described effects on Na and K permeability. Ca may be important in determining ACh receptor sensitivity.

0108 PANCREATIC ACINAR CELLS: THE ACETYLCHOLINE EQUILIBRIUM POTENTIAL AND ITS IONIC DEPENDENCY. (Eng.) Iwatsuki, N.; Petersen, O. H. (Dept. Physiology, Univ. Dundee, Dundee DD1 4HN, Scotland). *J. Physiol. (Lond.)* 269(3):735-751; 1977.

To gain insight into the ionic permeabilities of the pathways opened up by acetylcholine (ACh) in the pancreatic acinar cell membrane, the ACh equilibrium potential (E_{ACh}) was determined, and the effects of changes in K, Na, and Cl concentrations were investigated. Two glass microelectrodes were inserted into neighboring cells from rat or mouse pancreatic segments, superfused *in vitro*. The tip of a third glass microelectrode, filled with 2 M AChCl, was placed just outside the acinus. Membrane potential and resistance, and changes in these parameters in response to short pulses of ACh stimulation, were recorded. The resting current-voltage relationship, obtained by injecting 100 msec depolarizing or hyperpolarizing current pulses through one of the intracellular microelectrodes and recording the membrane potential with the other intracellular electrode, was linear within the range -5 to -60 mV. When the acinar cell membrane was hyperpolarized, the amplitude of ACh-evoked depolarization was increased, while ACh-evoked depolarization was reduced when the membrane potential was reduced by depolarizing current, and finally changed into a hyperpolarization at very low membrane potentials. In each acinus investigated (rat and mouse), there was a linear relationship between amplitude of ACh-evoked potential change (ΔV) and resting membrane potential. During superfusion with control solution, the value of the membrane potential at which ACh did not evoke a potential change was about -15 mV in the mouse and about -20 mV in the rat. During superfusion with a chloride-free sulphate-containing solution (steady state), a linear relationship between ΔV and resting membrane potential was again found, but E_{ACh} (mouse) was about +10 mV. Replacing extracellular chloride by sulfate caused an immediate change in E_{ACh} in the positive direction. Readmission of chloride, after a long period of chloride ion deprivation, caused an immediate sharp change in E_{ACh} in the negative direction. Replacing extracellular sodium by Tris caused an immediate transient negative change in E_{ACh}. In contrast, removing extracellular calcium changed E_{ACh} in a positive direction. Augmenting extracellular potassium concentration to 40 mM caused a change in E_{ACh} in the positive direction. At a membrane potential (V) equal to E_{ACh}, the sum of ionic currents evoked by the action of ACh is zero. ACh increased membrane Na, K, and Cl permeability. The approximate relative ion permeabilities of the pathways opened up by ACh are $P_{Na}/P_K=2.5$ and $P_{Cl}/P_K=5$. At $V=E_{ACh}$, the approximate relative sizes of the ACh-evoked currents are $I_{Na}/I_K=2.6$ and $I_{Cl}/I_K=1.6$. ACh, therefore, causes influx of Na and Cl and a small efflux of K.

0109 PARALLEL SECRETION OF DIGESTIVE ENZYMES BY THE IN VITRO RABBIT PANCREAS. (Eng.) Steer, M. L.; Glazer, G. (Beth Israel Hosp., Boston, MA 02215). *Am. J. Physiol.* 231(6):1860-1865; 1976.

The total output of proteins and the secretion of the enzymes, α-amylase, trypsinogen, and chymotrypsinogen by the rabbit pancreas stimulated *in vitro* by methacholine, cholecystokinin-pancreozymin (CCK-PZ), or Sincalide (C-terminal octapeptide of CCK-PZ) was studied. The entire pancreas with an attached loop of duodenum and segment of colon was excised *en bloc* from New Zealand white rabbits and mounted in an incubation chamber. Pancreatic juice samples were collected for 1-hr periods prior to and after addition of the stimulants to the incubation medium. The final concentration of methacholine added was 0.8 mg/100 ml, that of CCK-PZ was 4 Ivy dog U/100 ml, and that of Sincalide was 12 Ivy dog U/100 ml. The protein concentration was significantly increased ($p<0.01$ and $p<0.005$) in all juice samples collected after the addition of stimulants. When the ratio of each enzyme to the others for each animal and for each collection period was measured, only paralleled discharge of the three enzymes was observed. The results are consistent with the mass-transport theory of enzyme synthesis and secretion by the exocrine pancreas.

0110 EFFECT OF GLUCAGON ON THE SECRETORY PROCESS IN THE RAT EXOCRINE PANCREAS. (Eng.)

Adler, G. (Dept. Cell Biology and Cell Pathology, Philipps-Univ. Marburg, Robert-Koch-Str. 6, D-3550 Marburg, W. Germany). *Cell Tissue Res.* 182(2): 193-204; 1977.

The effect of glucagon on the enzymes, ultrastructure, and secretion of the pancreas was studied in rats. Glucagon (10-80 μg/hr) was infused i.v. into conscious rats for up to 24 hr. The effect on the secretory process was studied *in vitro* using isolated pancreatic lobules. A pronounced inhibition of the rate of protein synthesis and discharge of stored and newly synthesized proteins, combined with increased enzyme content, were observed after 30 min of infusion. At a glucagon infusion of 50 μg/hr, amylase, lipase, and chymotrypsin levels increased approximately 30% over the control levels. This effect was absent after longer infusion periods of up to 6 hr. After 12- to 24-hr infusions, a marked degranulation and decrease in enzyme content was observed. While the rate of protein synthesis was not significantly enhanced, both the basal and stimulated discharge of enzymes from the pancreas were increased. The results suggest a biphasic response of the pancreas to prolonged glucagon infusion.

0111 Ca^{++} FLUXES IN ISOLATED CELLS OF RAT PANCREAS. EFFECT OF SECRETAGOGUES AND DIFFERENT Ca^{++} CONCENTRATIONS. (Eng.)

Kondo, S.; Schulz, I. (Max-Planck-Institut fur Biophysik, 6 Frankfurt [Main], W. Germany). *J. Membr. Biol.* 29 (1/2):185-203; 1976.

The effects of secretagogues and of different calcium concentrations on ^{45}Ca influx and efflux were studied in isolated rat pancreatic cells to characterize the mechanism of Ca^{2+} transport. The secretagogues pancreozymin, carbamylcholine, gastrin I, the octapeptide of pancreozymin, and cerulein, as well as the Ca^{2+}-ionophore A 23187, stimulated ^{45}Ca efflux from isolated cells. The nonsecretagogic hormones isoproterenol, secretin, as well as dibutyryl cyclic AMP and dibutyryl cyclic guanosine 3',5'-monophosphate, had no effect on ^{45}Ca efflux. Atropine blocked the stimulatory effect of carbamylcholine on ^{45}Ca efflux completely, but not that of pancreozymin. A graphical analysis of the Ca^{2+} efflux curves revealed at least three phases: a first phase, probably derived from Ca^{2+} bound to the plasma membrane; a second phase, possibly representing Ca^{2+} efflux from cytosol of the cells; and a third phase, probably from mitochondria or other cellular particles. The Ca^{2+} efflux of all phases was stimulated by pancreozymin and carbamylcholine. Ca^{2+} efflux was not significantly affected by the presence or absence of Ca^{2+} in the incubation medium. Metabolic inhibitors of ATP production, Antimycin A and dinitrophenol, which inhibit Ca^{2+} uptake into mitochondria, stimulated Ca^{2+} efflux from the isolated cells, but inhibited the slow phase of Ca^{2+} influx, indicating the role of mitochondria as an intercellular Ca^{2+} compartment. Measurements of the $^{45}Ca^{2+}$ influx at different Ca^{2+} concentrations in the medium revealed saturation type kinetics, which are compatible with a carrier or channel model. The hormones mentioned above stimulated the rate of Ca^{2+} translocation. The data suggest that secretagogues of pancreatic enzyme secretion act by increasing the rate of Ca^{2+} transport, most likely at the level of the cell membrane, and that Ca^{2+} exchange diffusion does not contribute to the $^{45}Ca^{2+}$ fluxes.

0112 STIMULUS-SECRETION COUPLING IN PANCREATIC ACINAR CELLS: INFLUENCES OF EXTERNAL SODIUM AND CALCIUM ON RESPONSES TO CHOLECYSTOKININ-PANCREOZYMIN AND IONOPHORE A23187. (Eng.)

Kanno, T.; Saito, A.; Sato, Y. (Faculty Veterinary Medicine, Hokkaido Univ., Sapporo, 060, Japan). *J. Physiol. (Lond.)* 270(1):9-28; 1977.

The roles of sodium and calcium ions in stimulus secretion coupling were analyzed in the isolated and perfused rat pancreas. Partial replacement of NaCl with LiCl produced a diminution in both amylase output and pancreatic juice flow induced by cholecystokinin-pancreozymin (CCK-PZ, 5 mU/ml), and almost normal responses were usually regained immediately after the reintroduction of a standard concentration of NaCl. Nearly total replacement of NaCl with LiCl caused an almost complete inhibition of the responses, although 25 mM $NaHCO_3$ and 1 mM NaH_2PO_4 were still present, and only partial recovery was obtained after the reintroduction of a standard concentration of NaCl. A quantitative relation was found between the amount of amylase released by CCK-PZ and the $[Na^+]_0$ over the range 26-157 mM in the presence of 2.5 mM Ca. A similar relationship was also observed when $[Ca^{2+}]_0$ was decreased to 1.0 mM, but the responses were reduced to about one-half of those observed with 2.5 mM Ca. The cellular mechanism of CCK-PZ-induced amylase output may involve the dominant activity of a complex composed of a carrier molecule bearing one Ca and four Na molecules, if there is no interaction between Na^+ and Li^+. A quantitative relation was also found between the amount of pancreatic juice flow stimulated by CCK-PZ and $[Na^+]_0$ over the range 26-157 mM, in the presence of 1.0 or 2.5 mM Ca. A similar quantitative relationship was found between the amount of amylase released by Ca ionophore A23187 and $[Na^+]_0$ in the presence of 2.5 or 5.0 mM Ca. This may also involve the dominant activity of a complex composed of a carrier molecule bearing one Ca and four Na molecules, if there is no interaction between Na^+ and Li^+.

0113 THE EFFECT OF SOMATOSTATIN ON EXOCRINE PANCREAS SECRETION IN THE DOG STIMULATED BY PANCREOZYMIN-SECRETIN, OR BY A TEST MEAL.

(Ger.) Kayasseh, L.; Stalder, G. A.; Gyr, K.; Rittmann, W. W.; Girard, J. (Medizinische Universitatspoliklinik, Hebelstrasse 1, CH-4056 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107(15):541-542; 1977.

The effect of somatostatin (SST) on the exocrine pancreas of dogs with pancreatic and gastric fistulae was investigated during stimulation by pancreozymin-secretin or by a test meal. Chronic pancreatic and gastric fistulae were made following ligation of the minor pancreatic duct. The exocrine pancreas was infused with 2 IU of secretin-pancreozymin for 150-180 min, and SST was first given as a bolus injection (3.5 μg/kg) followed by infusion (3.5 μg/kg/hr). In another experiment, the pancreas was stimulated by means of an intragastrically administered Lundh test meal (5 ml/kg). SST caused a significant inhibition of stimulated enzyme secretion of the exocrine pancreas; protein secretion into the pancreatic juice was reduced by 54% (273.7 ± 57.2 to 125.8 ± 4 mg/hr) and amylase by 57.7% (42,115.9 ± 8,928.8 to 17,817 ± 5,098 U/hr). However, bicarbonate secretion and volume did not change significantly. The bicarbonate concentration was reduced by 8.1% (133.8 ± 1.7 U/hr to 123 ± 3.9 U/hr). The bilirubin content of the duodenal juice also decreased significantly (by 88%) during SST treatment (from 32 to 3.8 mg%). Similarly in the Lundh test meal trial, SST caused a 71% decrease in trypsin concentration (23 ± 3.3 to 6.7 ± μEqH^+/ml/min) and a 57.2% decrease in amylase level (208.5 ± 27.3 to 89.2 ± 18.4 U/ml). The total volume of duodenal juice was reduced by 51.2% (213 ± 29.6 to 104 ± 36.5 ml/hr).

0114 INFLUENCE OF SECRETIN ON CAERULEIN STIMULATED PANCREATIC SECRETION OF THE RAT.

(Eng.) Linari, G.; Linari, M. B. (Inst. Medical Pharmacology I, Univ. Rome, 0185 Rome, Italy). *Pharmacol. Res. Commun.* 9(7):633-641; 1977.

The pancreatic dose-response relationship to graded doses of cerulein was studied in female Wistar rats under acute fistula conditions. Cerulein (3.75-101.25 ng/kg/min, i.v.) was infused over a continuous secretin background (6 U/kg/hr). In comparison with rats that did not receive secretin, the flow of juice was significantly ($p<0.01$) increased in response to all doses of the peptide, but only the rate of 101.25 ng/kg/min produced a significant increase of amylase output. A good correlation between flow and enzyme secretion was seen. Amylase concentrations were about 30% lower than in animals not infused with secretin. The secretin background determined an increase of the calculated maximal response of amylase secretion to cerulein and a decrease of the ED_{50} value of the peptide. These studies demonstrate that the kinetics of the pancreatic response to cerulein are modified by a secretin background.

0115 AMINO ACID TRANSPORT IN THE RAT EXOCRINE PANCREAS. II. INHIBITION BY LANTHANUM AND TETRACAINE.

(Eng.) Bieger, W.; Peter, S.; Volkl, A.; Kern, H. F. (Dept. Anatomy, Univ. Heidelberg, Heidelberg, W. Germany). *Cell Tissue Res.* 180(1):45-62; 1977.

The effect of increasing concentrations of lanthanum and tetracaine on the accumulation of labeled neutral amino acids in the free intracellular pool of isolated rat pancreatic lobules was studied *in vitro*. The two calcium antagonistic agents caused severe disturbances in the secretory process of the exocrine pancreas, including inhibition of the rate of protein synthesis and exocytosis. The former effect resulted mainly from the inhibition of amino acid transport. Lanthanum (up to 1 mM) inhibited the transport of different species of amino acids in an unspecific way, whereas tetracaine interfered specifically with the Na^+-dependent transport system for neutral amino acids (^{14}C-α-aminoisobutyric acid). Na^+-independent transport of neutral amino acids (^3H-leucine) was not affected. Transport inhibition was correlated to the activity of the Na^+,K^+-ATPase system, which was measured in isolated plasma membrane fractions. At higher concentrations (5-10 mM), some uptake of lanthanum into the cells by limited endocytosis was observed. At lower concentrations, lanthanum seemed to bind exclusively to certain components of the plasma membrane, mainly at the lateral and basal cell surface. Even at 5-10 mM, no binding to the apical surface occurred. Similarly, lanthanum was not bound to the limiting membrane of isolated zymogen granules, but the mitochondria in the same fraction showed considerable binding affinity. The action of lanthanum and tetracaine on membrane carrier systems did not affect the interior organization of the plasma membrane. Particle density and distribution in freeze-fracture replicas as well as the submembrane microfilamentous-microtubular system and the junctional elements remained unaffected.

0116 EVIDENCES FOR DUODENOPANCREATIC REFLEXES AND ANTI-CCK FACTOR WITH LIDOCAINE INFUSED INTRAVENOUSLY AND SPRAYED TOPICALLY ON PANCREATIC PAPILLA IN NONALCOHOLIC AND ALCOHOL-FED DOGS.

(Eng.) Tiscornia, O. M.; Sarles, H.; Voirol, M.; Levesque, D.; Dzieniszewski, J.; Palasciano, G.; *et al.* (Unite de Recherches de Pathologie Digestive, INSERM, 46 Chemin de La Gaye, 13009 Marseilles, France). *Am. J. Gastroenterol.* 66(3):221-240; 1976.

The effect of lidocaine, injected i.v. or applied topically to the duodenal pancreatic papilla, on secretin-induced pancreatic secretion was studied in 14 duodenal fistula dogs, 4 of which had been alcohol-fed for 2 yr. Lidocaine was also applied directly to the papilla or injected into dogs that had received secretin and cholecystokinin (CCK). Pancreatic secretion was measured by flow rate during 20 min, bicarbonate concentration and output, and protein concentration and output. Lidocaine applied topically to the duodenal pancreatic papilla inhibited pancreatic secretion but had the opposite effect in dogs administered CCK plus secretin. Chronic alcohol feeding enhanced the lidocaine-induced rise in pancreatic secretion in dogs given CCK and secretin. When lidocaine was injected i.v., no significant changes in pancreatic secretion were observed in nonalcoholic dogs. Effects similar to those of topically applied lidocaine were observed with i.v. lidocaine in alcoholic and nonalcoholic superimposed on CCK and secretin stimulation did not prevent and actually elevated the i.v. lidocaine-induced pancreatic secretion changes. It is postulated that lidocaine acts directly on the papilla by interrupting duodenopancreatic reflexes. Lidocaine may modify pancreatic secretion in the CCK- and secretin-stimulated animals by depressing an anti-CCK factor secreted by the small intestine.

0117 ROLE OF THE PANCREAS IN STABILITY OF MITOCHONDRIAL FUNCTION IN HEMORRHAGIC SHOCK. (Eng.) Sato, M.; Yamamoto, M.; Ozawa, K.; Honjo, I. (Dept. Surgery, Kyoto Univ., Kyoto, Japan). *J. Surg. Res.* 23(1):19-24; 1977.

The role of the pancreas in adenine nucleotide and mitochondrial metabolisms during hemorrhagic shock was studied in male Wistar rats. Pancreatectomized rats showed more rapid depletion of energy stores during hemorrhagic shock than did nonpancreatectomized animals. In pancreatectomized rats the oxidative and phosphorylative activities of the mitochondria decreased markedly to about 40% of the preshocked levels at 1 hr after hemorrhagic shock, although those in control rats remained almost unchanged. The decreases in mitochondrial oxidative and phosphorylative activities and hepatic energy charge levels in pancreatectomized rats were not restored by the reinfusion of the shed blood after 1-hr hemorrhagic shock. It is suggested that the pancreas plays an important role in hepatic energy metabolism during hemorrhagic shock, possibly due to maintaining the integrity of mitochondrial membrane.

0118 ULTRASTRUCTURAL AND FUNCTIONAL CHANGES IN PANCREATIC ACINAR CELLS DURING AUTOLYSIS. (Eng.) Nevalainen, T. J.; Anttinen, J. (Lab. Electron Microscopy, Univ. Turku, Kiinamyllynkatu 10, SF-20520 Turku 52, Finland). *Virchows Arch.* [*Cell Pathol.*] 24(3):197-207; 1977.

Ultrastructural changes during *in vitro* autolysis were studied in the rat pancreas. Tissue samples were incubated at 18-20 C in a moist atmosphere for 0, 0.5, 1, 3, 6, 12, and 24 hr. The disintegration of acinar cells began by swelling of various cell compartments and gradual breakdown of cell membranes. Zymogen granules remained morphologically intact for at least 3 hr. There were no signs of increased autophagic activity during the observation period. Myelin figures and other membranous remnants of disintegrated cells, together with individual cells and cell organelles whose morphology was relatively well preserved were seen even after 24 hr incubation. The secretory response of acinar cells to pancreozymin stimulation, as measured by amylase release into the incubation medium *in vitro*, decreased progressively, approaching zero, during the 12-hr autolysis. No active trypsin was detected in the tissue samples during the 24-hr observation time. It is concluded that, during hypoxic autolysis at room temperature between 18-20 C *in vitro*, acinar cell disintegration results from breakdown of cellular membranes and that autophagocytosis is not involved, that most zymogen granules remain morphologically intact, even at the time when cell membranes show evidence of damage, that no trypsin activation takes place in the tissue during hypoxic autolysis, and that the acinar cells are capable of responding to secretory stimulation for 3-6 hr after removal of the tissue from the experimental animal.

0119 PANCREATITIS FOLLOWING THE INTRADUCTAL INJECTION OF PARTIALLY PURIFIED ENTEROKINASE IN DOGS. (Eng.) Hammond, J. B.; Mann, N. S. (Veterans Admin. Lakeside Hosp., 333 E. Huron, Chicago, IL 60611). *Am. J. Dig. Dis.* 22(3):182-188; 1977.

To determine whether enterokinase (EK) alone can cause the experimental pancreatitis (PT) produced by proximal and distal closure of bile duct ligated dogs, saline suspensions of partially purified EK and other test materials were injected into the duct of Wirsung of dogs. After 24 hr, their pancreases were examined, and the increment in serum amylase was estimated. Following 0.5% EK administration, both PT and hyperamylasemia ensued; hyperamylasemia without PT occurred when EK was inactivated by heat, administered with trypsin inhibitor, or administered in more dilute solution. The injection of trypsin inhibitor or of hog gastric mucin also led to hyperamylasemia, but not to PT. It is concluded that the PT observed was due to EK activity and that EK could contribute to the production of PT in the closed duodenal loop model. The hyperamylasemia observed in the absence of PT is unexplained, but appears to be related to the colloidal properties of the materials injected.

0120 INSULIN SECRETION AND PANCREATIC EXOCRINE SECRETION IN THE AGED. (Jpn.) Shimizu, Y.; Hiramatsu, K.; Miyake, K.; *et al.* (Okayama Univ. Sch. Medicine, Okayama, Japan). *Jpn. J. Geriatr.* 13(1):3-15; 1976.

0121 REPRODUCIBILITY OF VISCOSITY ASSESSMENT IN PURE HUMAN PANCREATIC JUICE [Abstract].

(Eng.) Tympner, F.; Rosch, W.; Domschke, W.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nurnberg, Nurnberg, W. Germany). *Endoscopy* 9(3):191; 1977.

0122 POTENCY OF DES-HISTIDYL^1-SECRETIN FOR PANCREATIC SECRETION IN DOGS [Abstract]. (Eng.) Solomon, T. E.; Beyerman, H. C.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 25(4):574A; 1977.

0123 MECHANISMS OF HUMAN PANCREATIC POLYPEPTIDE (HPP) RELEASE [Abstract]. (Eng.) Taylor, I. L.; Richardson, C. T.; Feldman, M.; Walsh, J. H. (Veterans Admin. Wadsworth Hosp., Los Angeles, CA). *Clin. Res.* 25(4):574A; 1977.

0124 EFFECT OF BOVINE PANCREATIC POLYPEPTIDE (BPP) INFUSIONS ON GASTRIC AND BILIARY FUNCTION IN MAN [Abstract]. (Eng.) Greenberg, G. R.; McCloy, R. F.; Chadwick, V. S.; Adrian, T. E.; Baron, J. H.; Bloom, S. R. (Hammersmith Hosp., Ducane Rd., London, England). *Gut* 18(11): A978; 1977.

0125 PP IN THE ASSESSMENT OF PANCREATIC EXOCRINE FUNCTION [Abstract]. (Eng.) Adrian, T. E.; Besterman, H. S.; Mallinson, C. N.; Bloom, S. R. (Hammersmith Hosp., Ducane Rd., London, England). *Gut* 18(11):A982; 1977.

0126 CHOLINERGIC NERVOUS CONTROL OF THE PANCREAS. (Fre.) Tiscornia, O. M. (INSERM, U-31, 46, chemin de la Gaye, F 13009 Marseille, France). *Biol. Gastroenterol. (Paris)* 9(Suppl. 3): 255-275; 1976.

0127 MORPHOLOGICAL BASIS OF EXPERIMENTAL PANCREATITIS. (Rus.) Kiseleva, A. F.; Keisevich, L. V.; Degtiareva, L. V.; Diachenko, V. V. (Kiev Medical Inst., Kiev, USSR). *Vrach. Delo* (9):100-104; 1976.

See also, 0009, 0106, 0226, 0243, 0274, 0280, 0506, 0507, 0515, 0519, 0524, 0533, 0652.

SECRETION AND METABOLISM

Hepatobiliary Tract

0128 EFFECT OF FASTING ON THE BIOCHEMICAL PROPERTIES OF PERFUSED RAT LIVER. (Eng.) Lee, D.; Clark, D. G. (Univ. Otago Medical Sch., P.O. Box 913, Dunedin, New Zealand). *J. Surg. Res.* 23(1):43-49; 1977.

Livers from male Wistar rats that had been either fed *ad libitum* or fasted for 48 hr were perfused with bovine RBC in Krebs-Ringer buffer containing 3% bovine serum albumin, and their function was studied. There was little difference in the ability of livers from fed or fasted rats to produce bile. Livers from fed rats maintained their initial rate of urea synthesis (1.5 μmol/min) for 60 min, but livers from fasted rats maintained this rate for only 20 min. At the end of these periods, urea synthesis fell to 0.8 μmol/min and 0.6 μmol/min for livers from fasted and fed rats, resp. Potassium was released into the acellular fraction of the perfusate at a rate of 0.3 μEq/min 60 min after the start of perfusion of livers from fed rats and 20 min after the start of perfusion for fasted rats. Compared with unperfused controls, perfusion for 3 hr had little effect on the latency (62.2 ± 3.1% versus 60.5 ± 2.3% for controls) and sedimentability (62.6 ± 2.9% versus 68.0 ± 1.2% for controls) of β-glucuronidase or on the sedimentability (69.1 ± 2.2% versus 69.7 ± 0.7% for controls) of acid phosphatase in liver homogenates from fed rats. There was a significant decrease in latency of acid phosphatase (66.6 ± 1.7% versus 75.8 ± 1.8% for controls) in liver homogenates from fed rats. Perfusion of livers from fasted rats resulted in marked and statistically significant falls in the latency (46.4 ± 3.0% versus 72.8 ± 1.2% for controls) and sedimentability (56.4 ± 2.5% versus 78.1 ± 1.8% for controls) of acid phosphatase and in the sedimentability (53.4 ± 2.3% versus 65.7 ± 1.5% for controls) of β-glucuronidase. The fall in latency of β-glucuronidase (55.5 ± 1.7% versus 57.0 ± 1.9% for controls) was not statistically significant. It is concluded that the livers from fasted rats are less able to tolerate the stress of perfusion *in vitro* than livers from rats fed *ad libitum*.

0129 A MORPHOMETRIC STUDY OF THE INHIBITION OF AUTOPHAGIC DEGRADATION DURING RESTORATIVE GROWTH OF LIVER CELLS IN RATS RE-FED AFTER STARVA-

TION. (Eng.) Pfeifer, U.; Bertling, J. (Pathologisches Institut der Universitat, Josef-Schneider-Str. 2, D-8700 Wurzburg, W. Germany). *Virchows Arch.* [*Cell Pathol.*] 24(2):109-120; 1977.

The number of autophagic vacuoles (AV) in the liver cells of rats re-fed after starvation was quantitated. In the liver parenchymal cells of adult male rats re-fed on the evening of the fifth day after a period of absolute starvation, a nearly complete absence of AV was found by the morphometric determination of the fractional cytoplasmic volume of AV. The mean value for that parameter increased only gradually during periods of re-feeding. The value was found to be in the range of the control values only on, or after, the fifth day of re-feeding. As in previous experiments, in the control animals the number of AV was again found to be dependent on a circadian rhythm with maxima during the light, and minima during the dark, periods. This rhythm reappeared in the period of re-feeding without a shift in phase. In the controls as well as in the re-fed animals the "segregated fraction" was highest for microbodies, intermediate for mitochondria and glycogen, but rather low for the remaining components of the cytoplasm. It is suggested that long-term inhibition of cellular autophagy plays an important role in the restorative cellular growth of the liver during the recovery from the atrophy induced by starvation.

0130 HEPATIC HEMODYNAMICS IN AN EXPERIMENTAL ANIMAL WITH PARTICULAR REFERENCE TO HEPATIC ARTERY FLOW.

(Ger.) Thiel, H. (Med. Univ.-Klinik, Josef-Schneider-Strasse 2, 87 Wurzburg, W. Germany). *Fortschr. Med.* 95(27):1741-1744; 1977.

Hepatic and systemic hemodynamics were studied in healthy rats and rats with liver diseases, with particular emphasis on the regulation mechanism of the hepatic artery and compensatory changes of hepatic arterial blood flow. The trials were performed with the cardiac output fractionation technique in animals with portal hypertension (brought about in one of three ways: prehepatically after protracted occlusion of the portal vein, intrahepatically following cirrhosis induced by choline-deficient diet or carbon tetrachloride, or by granulomatous hepatitis induced by SiO_2 particles). The experiments were also carried out in animals with galactosamine hepatitis, rats with portacaval shunt, in regenerating rat liver after partial hepatectomy, and in rats with artificial systemic endotoxemia. Hepatic arterial blood flow in both the normal and abnormal liver was regulated by a venovasomotor reaction (after portacaval end-to-side shunt) and systemically by autoregulation. As portal liver blood flow decreased, hepatic arterial flow increased, especially after portacaval end-to-side shunt. However, this increase did not fully compensate for the diverted portal venous blood flow. A significant rise in circulating blood volume as a result of hemodilution was noted in protracted occlusion of the portal vein, in CCl_4-induced cirrhosis, and SiO_2-induced granulomatous hepatitis. A definite relation was noted between the elevation of circulating blood volume and the extent of portacaval shunt volume. Cardiac output and partial circulating times also showed a close relation to the extent of portacaval shunt flow.

0131 THE HEPATIC ARTERY: SUBSERVIENT TO HEPATIC METABOLISM OR GUARDIAN OF NORMAL HEPATIC CLEARANCE RATES OF HUMORAL SUBSTANCES.

(Eng.) Lautt, W. W. (Dept. Physiology, Univ. Saskatchewan, Saskatoon, Saskatchewan, Canada). *Gen. Pharmacol.* 8(2): 73-78; 1977.

Studies indicating that local tissue demands (at least within physiological limits) do not affect hepatic arterial flow and that the hepatic artery is not affected by metabolites or local hypoxia are reviewed. With the use of an electromagnetic flowmeter, a method by which uptake or output of bloodborne substances can be determined simultaneously with hemodynamic measurements of the intact liver was developed. O_2 delivery to cat liver was reduced to 68% of control; in spite of a marked reduction of O_2 content and O_2 pressure in the venous blood, no arterial vasodilation was seen, although the arteries supplying the gut did dilate. Thus, the hepatic artery is not subservient to local hepatic needs, at least within the limits examined. Other studies have shown that decreases in hepatic metabolism are not accompanied by decreased hepatic blood flow. It is suggested that the hepatic artery serves to maintain blood flow *per se* constant (as opposed to O_2 delivery). The significance of constant hepatic blood flow is indicated by the fact that altered hepatic blood flow produces altered rates of hepatic clearance of many substances. By compensating for wide fluctuations in portal venous flow, the hepatic artery prevents equally wide fluctuations in hepatic clearance rates of endogenous substances. The constancy of hepatic clearance rates thereby prevents wide swings in plasma hormone levels that would otherwise be finely controlled only by altered rates of synthesis and release from the endocrine glands. The hepatic artery is thus proposed to be subservient not to the liver but rather to the needs of the entire organism, and it is an essential component in the maintenance of stable levels of substances cleared by the liver.

0132 ENZYMATIC ELIMINATION OF SUBSTRATES FLOWING THROUGH THE INTACT LIVER.

(Eng.) Bass, L.; Keiding, S.; Winkler, K.; Tygstrup, N. (Dept. Mathematics, Univ. Queensland, Australia). *J. Theor. Biol.* 61(2):393-409; 1976.

Enzymatic elimination of a class of substrates by the liver is theoretically analyzed in terms of a convective model of the hepatic microcirculation carrying the substrates. The class of elimination reactions considered is represented by the irreversible phosphorylation of D-galactose by galactokinase; D-galactose is important as a diagnostic substance in liver disease. A model liver is considered that consists of a large number of tubes arranged in parallel, each corresponding to one sinusoid with its unidirectional blood flow and its adjoining parenchymal cells containing enzyme. The total blood flow through the liver and the total maximum elimination rate (Vmax) receive equal contributions from all sinusoids. The half-saturation concentration of the relevant substrate (Km) is the same throughout the model. The convective model establishes connections between the inflow and outflow substrate concentrations, the total blood flow, and the overall substrate elimination rate. The two kinetic parameters Vmax and Km are involved as constants to be inferred for each liver from the above four observable parameters. The model is used to predict the time course of galactose concentration in the hepatic artery and vein of a patient with liver disease after a single i.v. injection of galactose. The model shows a capacity of the liver to compensate in part for the effects of disease (loss of Vmax) by an increase in biochemical efficiency. The model is also tested and validated on four prolonged near-steady states that were established on a perfused isolated pig liver by controlled galactose infusions.

0133 QUANTITATION OF PATHWAYS OF ETHANOL METABOLISM.

(Eng.) Havre, P.; Abrams, M. A.; Corrall, R. J. M.; Yu, L. C.; Szczepanik, P. A.; Feldman, H. B.; *et al.* (Case Western Reserve Univ., Sch. Medicine, Cleveland, OH 44106). *Arch. Biochem. Biophys.* 182(1):14-23; 1977.

A method for estimating the sum of the contributions to ethanol oxidation by the microsomal ethanol-oxidizing system (MEOS) and by catalase in the intact liver cell is described. It depends upon a comparison of the fate of the *R* hydrogen of ethanol and the hydrogen bound to carbon-2 of sorbitol under identical conditions. One limitation of this method is that it is based on the assumption that isotopic discriminations are similar for alcohol dehydrogenase, MEOS, and catalase. For either or both the MEOS and catalase oxidations, there may be much greater isotopic discrimination than for alcohol dehydrogenase, so that ^3H conversion to ^3H_2O by either of these pathways finds relatively little expression in the data. Using incubation of liver slices from rat and monkey at an ethanol concentration of 3 mg/ml, and from rat at 1 mg/ml, alcohol dehydrogenase catalysis was found to account for an average of 89% or more of the initial metabolism of ethanol. The stereospecificity of the sorbitol dehydrogenase-catalyzed reaction was shown to be of the A type in the rat. Sorbitol oxidation in the intact liver cell was found to be irreversible.

0134 METABOLIC CONSEQUENCES OF ALCOHOL CONSUMPTION.

(Eng.) von Wartburg, J. P. (Medizinisch-chemisches Institut der Universitat Bern, Buhlstrasse 28, CH-3012 Bern, Switzerland). *Nutr. Metab.* 21(1/2/3):153-162; 1977.

The metabolism of alcohol is reviewed. The metabolic effects of alcohol are closely related to organic as well as societal aspects of alcoholism. Individual differences in the biologic sensitivity to ethanol are thought to represent important features underlying these afflictions. The results of recent biomedical research provide evidence for a biochemical individuality with respect to the enzymes involved in alcohol metabolism. Human liver alcohol dehydrogenase, the principle ethanol oxidizing enzyme in man, exists in multiple molecular forms (isoenzymes). In addition, a genetic polymorphism (atypical variant) is observed. Large racial differences are found for the prevalence of the variant enzyme, which is characterized by a high specific activity. Possible relationships of the individual isoenzyme pattern of alcohol dehydrogenase and of other alcohol metabolizing enzymes to the nature and extent of metabolic effects of ethanol are discussed.

0135 METABOLIC AND HEPATIC EFFECTS OF ALCOHOL.

(Eng.) Isselbacher, K. J. (Harvard Medical Sch., Boston, MA 02114). *N. Engl. J. Med.* 296 (11):612-616; 1977.

Effects of alcohol on carbohydrate, protein, amino acid, and lipid metabolism are discussed and some disorders associated with alcoholism are reviewed. Alcohol inhibits gluconeogenesis and can lead to hypoglycemia if there is a substantial depletion of liver glycogen. Galactose oxidation is also inhibited by alcohol, although this is not usually clinically apparent. Albumin and transferrin synthesis are inhibited by alcohol, while lipoprotein synthesis is stimulated; this latter effect may contribute to the hypertriglyceridemia associated with alcohol ingestion. The major effects of alcohol ingestion on lipid metabolism are hypertriglyceridemia and fatty liver, resulting from the stimulation of serum and liver triglycerides. The increased NADH-NAD ratio induced by alcohol ingestion leads to increased lactate production, resulting in hyperuricemia; increased delta-aminolevulinic acid synthesis, leading to increased porphobilinogen production; and decreased citric acid cycle activity. Other effects induced by alcohol include increased acetaldehyde levels in the blood and tissues, decreased serum magnesium and phosphate, increased catecholamine release leading to decreased beta-adrenergic-receptor sensitivity, increased oxygen consumption, and ketoacidosis. The pathogenesis of ketoacidosis may involve hormonal factors and enhanced generation of NADH. The ability of alcohol to decrease the intestinal absorption of sugars, amino acids, calcium, folic acid, vitamin B_{12}, and other nutrients may contribute to the impairment in nutrition that is frequently present in alcoholic patients. Recent observations may explain the morphological alterations seen in alcoholic hepatitis. Hepatocyte ballooning may involve hypoxemia (produced by the hypermetabolic state induced by alcohol), alcohol-induced retention of export proteins by the liver, and the antitubular action of alcohol. Collagen probably plays an important role in the development of cirrhosis.

0136 ETHANOL METABOLISM BY A TRANSPLANTABLE HEPATOCELLULAR CARCINOMA: ROLE OF MICROSOMES AND MITOCHONDRIA. (Eng.) Cederbaum, A. I.; Becker, F. F.; Rubin, E. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *J. Biol. Chem.* 251(17):5366-5374; 1976.

Ethanol metabolism was studied in rat hepatocellular carcinoma 252 (HC-252), and the effects of the activity of alcohol dehydrogenase, of the activity of the substrate shuttles, of the ability of the mitochondria to oxidize reducing equivalents, and of the activity of the microsomal ethanol-oxidizing system on this process were investigated. Ethanol metabolism in slices or homogenates of the transplantable carcinoma was 50-60% of the rate found in host liver slices or homogenates when they were expressed per gram of tissue wet weight and 70-80% of the liver when the rates were expressed per milligram of tissue protein. At 10 mM ethanol, the activities of alcohol dehydrogenase in tumor and liver supernatants were comparable. Tumor microsomes did not oxidize ethanol in the presence of a NADPH-generating system, indicating the absence of the microsomal ethanol-oxidizing system and catalase-mediated peroxidation of ethanol. The HC-252 microsomes were contaminated with catalase, and acetaldehyde production occurred in the presence of a H_2O_2-generating system (xanthine oxidase). The virtual absence of ethanol oxidation and drug metabolism (aminopyrine demethylase and aniline hydroxylase) in HC-252 microsomes may be due to the low activities of NADPH-cytochrome c reductase, NADPH oxidase, and NADPH-dependent oxygen uptake. Microsomal oxidation of ethanol was present in the well-differentiated tumor, Morris hepatoma 5123C, while activity was negligible in microsomes from Morris hepatoma 7288CTC, a less differentiated tumor. Microsomal NADPH oxidase was present in the well differentiated tumor 5123C, but was lacking in the less differentiated tumor 7288CTC. Several microsomal, mitochondrial, and cytosolic properties of HC-252 were similar to those of Morris hepatoma 7288CTC, but differed from those of the more differentiated 5123C tumor and normal liver. The content of mitochondrial protein in HC-252 was only 25% that of liver, and oxygen consumption was only 28% that of the liver. When corrected for the mitochondrial protein content, oxygen uptake in tumor HC-252 and liver homogenates was comparable. Isolated tumor and liver mitochondria displayed comparable state 4 and 3 rates of oxygen consumption with succinate and glutamate as substrates. The activities of the reconstituted malate-aspartate and α-glycerophosphate shuttles were only slightly lower in isolated HC-252 mitochondria than in liver mitochondria. Antimycin inhibited alcohol metabolism, and pyruvate stimulated alcohol metabolism, ism, and pyruvate stimulated alcohol metabolism, much less in tumor slices than in liver slices, suggesting the presence of an augmented mitochondria-independent, cytosolic mechanism for oxidizing reducing equivalents in the tumor. These factors suggest that oxidation of NADH is the limiting factor in ethanol metabolism. Whereas, in the liver mitochondrial reoxidation is predominant, in HC-252, cytosolic reoxidation of NADH also plays a major role.

0137 THE INFLUENCE OF CHRONIC ETHANOL FEEDING TO RATS ON THE INTEGRITY OF LIVER MITOCHONDRIAL MEMBRANE AS ASSESSED WITH THE Mg^{2+}-STIMULATED ATPase ENZYME. (Eng.) Hosein, E. A.; Hofmann, I.; Linder, E. (Dept. Biochemistry, McGill Univ., Montreal, Quebec H3G 1Y6, Canada). *Arch. Biochem. Biophys.* 183(1):64-72; 1977.

Mg^{2+}-stimulated ATPase, used as an indicator of liver mitochondrial membrane damage by ethanol in Sprague-Dawley rats was compared in two mitochondrial preparations using substrate concentrations that gave near V activity. Results obtained with this enzyme using different temperature and substrate concentrations showed that ethanol treatment to rats had affected both the activity of this enzyme and the liver inner mitochondrial membrane. This was evidenced by the appearance of a phase-transition temperature at 32 C in Arrhenius plots of samples from the alcoholic liver but not from the control liver. It was observed that when the assay was carried out below 26 C, mitochondria from rats treated chronically with ethanol had diminished ATPase activity. In mitochondrial ghosts, chronic ethanol feeding caused a decrease in the phase-transition temperature observed in Arrhenius plots, usually associated with the lipid phase transition, from the normal value of 18.5 ± 0.2 to 15.8 ± 0.3 C in the alcoholic rats. A similar decrease in phase-transition temperature was also obtained with sonicated liver mitochondrial membrane preparations from chronically ethanol-fed rats compared with chow-fed controls. Throughout the entire range of temperatures used, the activation energies of the control and chronic alcoholic mitochondrial preparations were different. These results affirm that chronic ethanol treatment alters the liver mitochondrial membrane structure or enzyme microenvironment, which, in turn, may affect mitochondrial function.

0138 EFFECT OF TEMPERATURE ON THE ASSAY OF HEPATIC ALCOHOL DEHYDROGENASE. (Eng.) Carter, E. A.; Isselbacher, K. J. (Harvard Medical Sch., Boston, MA 02114). *Proc. Soc. Exp. Biol. Med.* 155(3):290-295; 1977.

The effect of assay temperature (T) on alcohol dehydrogenase (ADH) activity was investigated in rat and horse liver supernatants and purified horse liver, yeast, and human liver ADH. The assay mixture consisted of 50 mM glycine-NaOH buffer (pH 9.6), 50 mM ethanol, 1.5 mM NAD, and 0.1 ml of ADH-containing fraction. By raising the T from 25 to 60 C, the ADH activity of rat and horse liver supernatants was stimulated eight- and threefold, resp. At 55 C, purified human liver ADH activity was 2.5 times greater, and purified horse liver activity two times greater. Hepatic ADH was not stimulated if the heated samples were allowed to cool to room T before ethanol was added and the assay was then carried out at 25 C. Purified yeast ADH activity was inhibited at T's >45 C. The stimulating effect of increased T may involve changes in enzyme function. When 2-butanol and 2-butanone were used as substrates, ADH activity was enhanced equally in both the forward and reverse directions. Increasing the T from 25 to 60 C increased the reduction of 17-β-hydroxy-5-β-androstan-3-one with NADH fivefold (from 13.9 to 63.3 nmol NADH oxidized/mg protein/min). Only at 50-60 C could ADH activity be detected in normal rat or human plasma. At 50 C, this activity (nmol NADH formed/ml plasma/10 min) increased from 30 to 85 and 118 at 1.5 and 3 hr, resp., after the administration of CCl_4 (2 ml/kg intragastrically) and from 8.9 to 14.4 after chronic ethanol feeding (5% of a liquid diet for 10 days). The increased sensitivity obtained by measuring plasma ADH activity at 50 C may make this assay useful for studying patients with liver injury.

0139 THE ROLE OF CYTOCHROME P-450 IN THE HYDROPEROXIDE-CATALYZED OXIDATION OF ALCOHOLS BY RAT-LIVER MICROSOMES.

(Eng.) Rahimtula, A. D.; O'Brien, P. J. (Dept. Biochemistry, Memorial Univ. Newfoundland, St. John's, Newfoundland A1C 5S7, Canada). *Eur. J. Biochem.* 77(1):201-208; 1977.

The roles of the microsomes of cytochrome P-450 and of catalase in hydroperoxide-catalyzed ethanol oxidation was investigated in rat liver microsomes. When cumene hydroperoxide was the oxidizing agent, the pH optimum for microsomal ethanol oxidation was approximately 8.0, while the catalase-dependent reaction showed no pH optimum within the range of pH 6.5-9.0 but increased with increasing pH. Both catalase and the microsomes gave an apparent Km for ethanol in the region of 4-9 mM, but the microsomes gave an additional Km for ethanol in the region of 40-75 mM. In the microsomes, the two Km values were obtained even in the presence of 0.1 mM hydroxylamine, suggesting that the lower Km of 4-9 mM is not due to the small amount of catalase present in the microsomes. Catalase and microsomes also behaved differently in the presence of several inhibitors. In general, cytochrome P-450-specific agents (e.g., metyrapone and hexobarbital) inhibited the microsomal reaction, while they had no effect on the catalase-dependent reaction. Catalase-specific inhibitors (e.g., aminotriazole and hydroxylamine) inhibited the catalase-dependent oxidation but not the microsomal reaction. Phenobarbital pretreatment of the rats raised the specific activity of cumene hydroperoxide-dependent ethanol oxidation per milligram of microsomes by 7.2-fold. These results indicate that, in addition to catalase, another enzyme, presumably cytochrome P-450, is responsible for cumene hydroperoxide-dependent ethanol oxidation. When H_2O_2 replaced cumene hydroperoxide as the oxidizing agent, ethanol oxidation was not increased by phenobarbital induction and was inhibited by hydroxylamine but not by metyrapone. These results indicate that the microsomal system behaves more like catalase in H_2O_2-catalyzed oxidation, suggesting that the microsomal catalase is responsible for H_2O_2-dependent ethanol oxidation.

0140 INFLUENCE OF ETHANOL OXIDATION RATE ON THE LACTATE/PYRUVATE RATIO AND PHOSPHORYLATION STATE OF THE LIVER IN FED RATS.

(Eng.) Poso, A. R.; Forsander, O. A. (Res. Lab. of the State Alcohol Monopoly, Alko, Box 350, SF 00101 Helsinki 10, Finland). *Acta Chem. Scand.* [*B*] 30(9):801-806; 1976.

To determine if the cytosolic redox changes induced by ethanol are reflected in the cytosolic phosphorylation state, the effect of the ethanol oxidation rate on the interaction between the phosphorylation state (the [ATP]/[ADP] x $[HPO_4]^{2-}$ ratio) and the redox state (the free $[NAD^+]$/[NADH] ratio) of the liver cytosol was studied in intact, fed, female Sprague-Dawley rats. The rate of ethanol oxidation was inhibited to different degrees; with 0, 0.1, 0.5, 1.0, and 2.0 mmol/g pyrazole, the ethanol oxidation rates were 4.6, 4.1, 3.6, 3.4, and 2.3 μmol/g liver (wet weight)/min, resp. The ethanol oxidation rate had no influence on the liver lactate level, but correlated significantly with the pyruvate level. Accordingly, a significant correlation was also found between the ethanol oxidation rate and the lactate/pyruvate ratio. The rate of ethanol oxidation correlated significantly with the liver 3-phosphoglycerate level. No change in the glyceraldehyde-3-phosphate level was found. No correlation was found between the ethanol oxidation rate and the glyceraldehyde-3-phosphate/3-phosphoglycerate redox couple. Ethanol administration slightly increased the liver ATP level, but the simultaneous administration of pyrazole eliminated this effect. Other adenine nucleotides and HPO_4^{2-} were not changed. The changes in the rate of ethanol oxidation had no effect on the phosphorylation state in the fed liver. It is assumed that in the fed liver the phosphorylation state is so well stabilized that the redox level has no influence.

0141 ATP METABOLISM IN AN ETHANOL INDUCED FATTY LIVER.

(Eng.) Gordon, E. R. (Montreal General Hosp., Montreal, Canada). *Biochem. Pharmacol.* 26(13):1229-1234; 1977.

The mechanism responsible for the decrease in phosphate potential in the liver of rats fed ethanol for prolonged periods was determined. Changes in ATP utilization were assessed by measuring the activity of the $[Na^+ + K^+]$-activated ATPase system, and changes in ATP synthesis were assessed by determining the activity of the adenine nucleotide translocase (ANT) system. Since long-chain coenzyme A (CoA) derivatives of fatty acids regulate the translocation of ADP into mitochondria, their total cellular content and mitochondrial level were also determined. After 2 weeks on a liquid diet in which 36% of the caloric intake was ethanol, male Sprague-Dawley rats developed a fatty liver. This change was not associated with any significant alteration in hepatic ATP content or in the activity of the ANT system. After 4 weeks, excess neutral lipid in the liver still persisted, but it was associated with a marked increase in the level of long-chain CoA fatty acid derivatives. The hepatic ATP level was only 50% of normal, and the rate of translocation of ADP into the mitochondria was decreased. The activity of the ANT system was restored to normal values if the long-chain CoA fatty acid derivatives were removed from the surface of the mitochondrial membrane by treatment of the preparation with defatted albumin. At this time, there was only a slight (15%) enhancement of the $[Na^{+}+K^{+}]$-activated ATPase system. With the removal of ethanol from the diet, the ATP level quickly returned to normal. Changes in the hepatic ATP level correlated well with the activity of the ANT system, but they did not parallel changes in the activity of the Na^{+} pump system. These findings indicate that the dominant feature leading to the decrease in the ATP/ADP x P_i ratio is a decreased synthesis of ATP.

0142 STUDIES IN THE ETHANOL-INDUCED CHANGES IN GLYCEROLIPID SYNTHESIS IN RATS AND THEIR PARTIAL REVERSAL BY n-(2-BENZOYLOXYETHYL)NORFENFLURAMINE (BENFLUOREX).

(Eng.) Pritchard, P. H.; Brindley, D. N. (Univ. Hosp. and Medical Sch., Clifton Blvd., Nottingham NG7 2UH, England). *J. Pharm. Pharmacol.* 29(6):343-349; 1977.

The hypothesis that benfluorex (S-780) might reverse the ethanol-induced synthesis of hepatic triacylglycerol (TG) was tested, and the effects of ethanol and S-780 on lipid metabolism were studied. Male Wistar rats were treated daily for 5 days with S-780 (50 mg/kg), and 2 hr after the fifth treatment they were intubated with ethanol (5 g/kg) or with isocaloric glucose. S-780 did not alter the absorption or oxidation of $[1-^{14}C]$ethanol, nor did it decrease the concentration of ethanol and its water soluble metabolites in the tissues examined. The rate of hepatic glycerolipid synthesis was measured *in vivo* using $[^{14}C]$palmitate and $[^{3}H]$glycerol, and the accumulation of $[^{14}C]$palmitate in various tissues was determined 4 hr after i.v. injection. Ethanol treatment increased the relative rate of hepatic TG synthesis and decreased the synthesis of phosphatidylcholine (PC), phosphatidylethanolamine (PE), and phosphatidylserine plus phosphatidylinositol (PS + PI). The relative flux from phosphatidate (PA) to diacylglycerol (DG) and TG was increased. These changes were reflected in the accumulation of $[^{14}C]$palmitate in hepatic lipids and were obtained under conditions where the net rate of $[^{14}C]$palmitate oxidation to $^{14}CO_2$ was greater in those rats treated with ethanol instead of glucose. S-780 did not alter the oxidation rates over a 4-hr period. Ethanol treatment increased the accumulation of $[^{14}C]$palmitate in the PS + PI fraction of lung and decreased the proportion in PE. In the kidney, it increased the concentration of $[^{14}C]$palmitate in TG, DG, and PE and decreased the concentration in PC and PS + PI. Pretreatment of the rats with S-780 partially reversed the changes in palmitate accumulation in glycerolipids caused by ethanol. S-780 treatment also decreased the rate of hepatic TG synthesis from glycerol in the rats fed glucose. It increased the percentage recovery of $[^{14}C]$palmitate in the livers and kidneys of glucose-fed rats and decreased that in adipose tissue. This treatment decreased the proportion of $[^{14}C]$palmitate recovered in the TG of the kidneys and lungs of these rats and increased the proportion in PI + PS. The results show that S-780 interferes with the balance between phospholipid and TG synthesis *in vivo*. It produces a decrease in the synthesis and accumulation of TG in rats treated both with ethanol and glucose.

0143 LIPID PEROXIDATION IN ISOLATED HEPATOCYTES FROM RATS INGESTING ETHANOL CHRONICALLY.

(Eng.) Remmer, H.; Albrecht, D.; Kappus, H. (Institut fur Toxikologie, Universitat Tubingen, Wilhelmstrasse 56, D-7400 Tubingen, W. Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 298(2):107-113; 1977.

The role of lipid peroxidation in ethanol-induced liver damage was investigated. Isolated hepatocytes from rats consuming ethanol (8.5 g/kg) daily produced twice as much malondialdehyde as liver cells from control animals. The release of LDH and the uptake of trypan blue in both control and test hepatocytes did not differ during the incubation period of 2 hr. Glutamate dehydrogenase (GLDH), however, was only set free into the medium from liver cells of ethanol-drinking rats, indicating that mitochondrial alterations are involved. Bromotrichloromethane ($CBrCl_3$) promoted lipid peroxidation in hepatocytes from ethanol-drinking rats to a much greater degree than in cells from control rats. The cell damage induced by $CBrCl_3$, indicated by a release of LDH and GLDH from the hepatocytes and by hepatic uptake of trypan blue was also much more pronounced in liver cells from ethanol-drinking animals. The stronger action of $CBrCl_3$ cannot be explained by an enhanced microsomal metabolism, because no increase of drug metabolizing enzymes was observed. The relatively low ethanol consumption did not influence body growth and liver weight and did not evoke any triglyceride accumulation. The normal balance between processes favoring lipid peroxidations and reactions protecting the liver cells seems to be shifted during alcohol intake to a state that promotes radical formation

0144 ROLE OF ACETALDEHYDE IN THE ETHANOL-INDUCED IMPAIRMENT OF GLYCOPROTEIN METABOLISM IN RAT LIVER SLICES.

(Eng.) Sorrell, M. F.; Tuma, D. J.; Schafer, E. C.; Barak, A. J. (Veterans Admin. Hosp., 4101 Woolworth Ave., Omaha, NB 68105). *Gastroenterology* 73(1):137-144; 1977.

The mechanism responsible for ethanol-induced changes in the glycosylation of proteins was investigated in rat liver slices. Ethanol (5-50 mM) decreased $[1-^{14}C]$glucosamine and $[^{14}C]$leucine incorporation into total liver and microsomal proteins and greatly inhibited incorporation into medium (secretory) proteins. Pyrazole (4 mM) prevented the inhibition of glycoprotein synthesis by ethanol. Additions of methylene blue or pyruvate, which corrected the disordered redox state caused by ethanol oxidation, did not reverse the inhibitory effects of ethanol on glycosylation. Sorbitol also inhibited glycosylation; however, fructose similarly inhibited glycoprotein synthesis without altering the redox state. When low levels of acetaldehyde (0.12-0.70 mM) were maintained in the medium by means of infusion, a significant inhibition of glycoprotein synthesis was observed. Acetate did not impair glycosylation. These data suggest that the ethanol-induced impairment of glycoprotein synthesis and secretion is a consequence of ethanol metabolism and further suggest that this inhibition is attributable to acetaldehyde formation rather than to the altered redox state resulting from ethanol oxidation.

0145 EFFECT OF A LOW-PROTEIN DIET ON ACETALDEHYDE METABOLISM IN RATS. (Eng.)

Lindros, K. O.; Pekkanen, L.; Koivula, T. (Res. Lab. of the State Alcohol Monopoly, Box 350, SF-00101 Helsinki 10, Finland). *Acta Pharmacol. Toxicol.* 40(1):134-144; 1977.

The effect of dietary changes on liver alcohol and aldehyde dehydrogenase activities, as related to effects on ethanol and acetaldehyde metabolism, was investigated in male Sprague-Dawley rats. Feeding for 8 weeks on diets rich in carbohydrate or fat, but with normal protein content, induced minor changes relative to giving a balanced diet. A low-protein, high-carbohydrate diet (5% and 80% of calorie content, resp.) caused a significant ($p<0.001$) reduction of both alcohol and aldehyde dehydrogenase activities in the liver. The activity of the high K_m aldehyde dehydrogenase in the microsomal and soluble fractions appeared to be more reduced than that of the low K_m enzyme in the mitochondrial fraction. The blood acetaldehyde level was significantly ($p<0.001$) higher in rats on the protein-deficient diet in spite of their reduced ethanol elimination rates. The results suggest that protein deficiency deranges acetaldehyde metabolism and may thus increase the possible contribution of acetaldehyde to the effects caused by ethanol metabolism.

0146 KINETICS OF SHEEP-LIVER CYTOPLASMIC ALDEHYDE DEHYDROGENASE. (Eng.)

MacGibbon, A. K. H.; Blackwell, L. F.; Buckley, P. D. (Dept. Chemistry, Massey Univ., Palmerston North, New Zealand). *Eur. J. Biochem.* 77(1):93-100; 1977.

The steady-state parameters of aldehyde oxidation were studied in sheep. Sheep liver cytoplasmic aldehyde dehydrogenase showed little pH dependence of V or k_{cat}. Some buffer anion effects were noted. The oxidation of aldehydes at pH 7.6 was quantitative, but irreversible. The initial velocity data indicated a sequential mechanism for the addition of substrates. Inhibition by NADH and the product analogue 2-bromo-2-phenylacetic acid, together with the known tight binding of NADH to the free enzyme, indicated an ordered mechanism with NAD^+ as leading substrate. Values for the rate of binding and dissociation of NAD^+ were obtained from the steady-state data. The values obtained were identical with those calculated from the data for the horse liver cytoplasmic enzyme. Close similarities are, in general, apparent for the horse and sheep liver cytoplasmic enzymes and with other tissue aldehyde dehydrogenases. Apparent substrate activation was observed with high concentrations of both acetaldehyde and propionaldehyde, a limiting value of 0.25/sec being obtained for k_{cat}. No isotope effect was observed on V using 1-^2H-propionaldehyde as substrate, suggesting that NADH release might be rate-limiting in the steady-state.

0147 ENZYMATIC DETERMINATION OF BILE ACIDS. THE NADP-SPECIFIC 7α-HYDROXYSTEROID DEHYDROGENASE FROM P. testosteroni (ATCC 11996). (Eng.)

Skalhegg, B. A.; Fausa, O. (Dept. Biochemistry, Nyegaard and Co. A/S, Nycovn. 2, Oslo 4, Norway). *Scand. J. Gastroenterol.* 12(4):433-439; 1977.

Using the specific substrates 7α-hydroxy-5β-cholanic acid and 3α,7α,12α-trihydroxy-3,12-diacetyl-5β-cholanic acid methyl ester, crude extracts of *Pseudomonas testosteroni* grown on a steroid-containing medium were shown to exhibit 7α-hydroxysteroid:NADP-oxidoreductase activity. The enzyme was highly specific for NADP. Both free and conjugated 7α-hydroxy bile acids could act as substrates, but those of low polarity (few hydroxyl groups) seemed to be preferred, judging from initial reaction velocity studies. The optimal conditions appeared to be at pH 8.5-9.5 and at 25 C. Free sulfhydryl groups were essential for maximum catalytic activity, since the enzyme was inhibited by sulfhydryl-reacting substances such as *p*-chloromercuribenzoate and monoiodoacetic acid. The ketone-trapping agents, hydrazine hydrate and semicarbazide, acted as inhibitors. Upon dilution, the storage stability was severely reduced, but this effect was counteracted by the addition of glycerol at at concentration of 20% or more. Gel filtration experiments on Sephadex G-100 indicated that the molecular weight was about 80,000. Thus, when this enzyme is used for bile acid determination in different biological fluids, a 60-min incubation time at pH 8.5-9.5 and 25 C should be used. Sulfhydryl-reacting substances should be avoided, and EDTA should be included in the assay mixture to chelate heavy metal ions.

0148 EFFECTS OF CHRONIC CHOLERETIC INFUSIONS OF BILE ACIDS ON THE MEMBRANE OF THE BILE CANALICULUS: A BIOCHEMICAL AND MORPHOLOGIC STUDY. (Eng.)

Nemchausky, B. A.; Layden, T. J.; Boyer, J. L. (SDTU Veterans Admin. Hosp. Hines, Hines, IL 60141). *Lab. Invest.* 36(3):259-267; 1977.

To determine whether choleretic infusions of bile acids modify the function or structure of the bile canalicular membrane, sodium taurocholate (NaTc) or dehydrocholate (DHC) was infused into male rats at a rate of 80 µmol/hr over an 18-hr period. Bile was collected by fistula, and phospholipid and cholesterol content was measured in bile, liver homogenates, and isolated liver plasma membranes (LPM) enriched in bile canaliculi. Na^-,K^+-ATPase, Mg^{2+}-ATPase, 5'-nucleotidase, and alkaline phosphatase activities were also measured in LPM. NaTc infusions enhanced cholesterol and phospholipid output in the bile (0.35 ± 0.12 and 3.40 ± 1.13 nmol/min/g before infusion for cholesterol and phospholipid, resp.; 1.17 ± 0.39 and 10.04 ± 3.94 nmol/min/g after infusion; $p<0.001$ in both cases) in association with a significant increase in phospholipid in both LPM and liver homogenates. Although DHC infusions resulted in a comparable excretion of bile acid, phospholipid, and cholesterol, output in bile did not increase from control values, and the concentration of these lipids in LPM and liver homogenates also did not change. However, LPM Na^+, K^+-ATPase significantly increased after DHC infusions compared to NaTc-infused animals or controls. Neither bile acid altered the activities of Mg^{2+}-ATPase, 5'-nucleotidase, or alkaline phosphatase. Both bile acids increased the diameter of the bile canalicular lumen as assessed by scanning electron microscopy, and produced irregularities and outpouchings in the canalicular membrane. Diverticuli and loss of microvilli were most prominent with DHC infusions, but canalicular side branching and the density of microvilli either remained unchanged or increased following NaTc infusions. Although the morphologic findings are qualitative, the results indicate that chronic choleretic infusions of NaTc and DHC have divergent effects, not only on enzyme activities in LPM, but also on phospholipid composition and three-dimensional structure. These findings suggest that bile acids may alter biliary secretion through their osmotic effects and by modifying lipids and enzymes in the bile canalicular membrane.

0149 PROLONGED INDUCTION OF GERMFREE BILE ACID PATTERN IN CONVENTIONAL RATS BY ANTIBIOTICS.

(Eng.) Gustafsson, B. E.; Gustafsson, J. A.; Carlstedt-Duke, B. (Dept. Germfree Res., Karolinska Institutet, Stockholm, Sweden). *Acta Med. Scand.* 201(3):155-160; 1977.

The duration of the germfree pattern of fecal bile acids was studied in male conventional rats following the administration of antimicrobial drugs. The rats received benzylpenicillin, neomycin, kanamycin, erythromycin, bacitracin plus neomycin, succinylsulfathiazole, or metronidazole (360,000 IU/kg, 180 mg/kg, 35 mg/kg, 360 mg/kg, 27,000 IU and 550 mg/kg, 360 mg/kg, or 20 or 100 mg/kg, resp.) by stomach tube for 5 days. Total fecal bile acids were analyzed in samples collected during periods of 3 days during the pretreatment period and during the 8 weeks following drug treatment. Metronidazole or succinylsulfathiazole had no or minor effects on the conventional bile acid pattern and the "bile acid index" (β-muricholic acid/deoxycholic acid) remained low. Benzylpenicillin, neomycin, or kanamycin induced a germfree bile acid pattern, i.e., increased the relative amounts of α- and β-muricholic acid in feces and eliminated deoxycholic acid and hyodeoxycholic acid from feces. The high bile acid index was normalized within 3 weeks after the termination of drug treatment, but the excretion of α- and β-muricholic acid was not normalized until a normal flora had been established by giving an enema with intestinal contents from intact, conventional rats. Treatment with erythromycin or bacitracin plus neomycin also produced a germfree bile acid pattern. In these cases, the bile acid index did not normalize after 5-8 weeks, and the excretion of the muricholic acids was not normalized until an enema with intestinal bacteria had been given. It is suggested that these long-lasting effects of antibiotics on the metabolism of bile acids in the intestinal tract should be considered after short-term antibiotic therapy in humans.

0150 DISSOLUTION RATES OF MODEL GALLSTONES IN HUMAN AND ANIMAL BILES AND IMPORTANCE OF INTERFACIAL RESISTANCE.

(Eng.) Molokhia, A. M.; Hofmann, A. F.; Higuchi, W. I.; Tuchinda, M.; Feld, K.; Prakongpan, S.; *et al.* (Coll. Pharmacy, Univ. Michigan, Ann Arbor, MI 48109). *J. Pharm. Sci.* 66 (8):1101-1105; 1977.

Cholesterol monohydrate dissolution kinetics in human gallbladder bile were studied to determine the magnitudes of the *in vitro* dissolution rates, the rate resistances in human gallbladder bile, and the extent that the interfacial resistance is the rate determining factor. Dissolution rate studies also were conducted using human duodenal bile and animal bile (baboon, dog, and chicken gallbladder bile) for comparison. The dissolution rate resistance, R, ranged from 10^4sec/cm for chicken bile to 10^4-10^6 sec/cm for human bile. Interfacial resistance was the rate-determining factor for all results. Where chemical composition data were obtained, the R values for the human bile samples were consistent with predictions made from the simulated bile studies. In two human gallbladder specimens with low bile acid-lecithin molar ratios (i.e., 2.9 and 2.3), very high R values of 1.9×10^5 and 4.1×10^5 sec/cm were found. These values were in good agreement with the findings in the simulated bile studies and suggest that stone dissolution in patients with low bile acid-lecithin ratios may proceed very slowly, even when the bile is highly undersaturated with respect to cholesterol.

0151 EVALUATION OF A NEW MONKEY MODEL FOR THE REPEATED STUDY OF BILE SECRETORY PHYSIOLOGY.

(Eng.) Wood, R. A. B.; Baker, A. L.; Hall, A. W.; Boyer, J. L.; Moossa, A. R. (Dept. Surgery, Univ. Chicago, 950 E. 59th St., Chicago, IL 60637). *Ann. Surg.* 185(3):349-355; 1977.

An unchaired monkey model for the repeated long-term study of biliary secretory physiology is reported. Postoperative management with cholangiography and long-term follow-up of weight gain and liver function were recorded. Evaluation was performed by repeated measurement, over a period of months, of bile flow and ^{14}C-erythritol clearance at three rates of i.v. taurocholate infusion in a random order. The response to secretin was tested at the final infusion rate of taurocholate for each experiment. The procedure was performed on nine monkeys, two died before the study as a result of surgical complications and two others were studied twice before they died. The remaining monkeys were studied 8, 7, 5, 3, and 2 times, resp., over a 4- to 7-month period. They demonstrated an increase in bile flow and ^{14}C-erythritol clearance with increasing bile salt output. A dramatic choleresis over a wide range of bile salt excretion was noted with secretin, and a linear relationship between bile bicarbonate output and bile salt secretion rate was observed. The new model has several major advantages and gives higher bile flows than previously recorded in the chaired model.

0152 THE CONTRIBUTION OF THE EXTRAHEPATIC BILE DUCTS TO BILE FORMATION.

(Eng.) Strasberg, S. M.; Petrunka, C. N.; Ilson, R. G. (Medical Sciences Bldg., Univ. Toronto, Toronto, Ontario M5S 1A8, Canada). *Can. J. Physiol. Pharmacol.* 54(5):757-763; 1976.

The contribution of the extrahepatic bile ducts to bile flow was examined in the rhesus monkey. Bile flow from the two sides of the liver was divided. The major extrahepatic bile ducts remained connected to only one side of the liver. Bile flow, and the concentration of ^{14}C-erythritol, bicarbonate, bile acid, and bilirubin in bile samples from the two sides of the liver were measured and compared in the fed state. An estimate of the net flow from the extrahepatic ducts was obtained from the ^{14}C-erythritol concentrations on the two sides of the liver and the bile flow rate on the side with the extrahepatic ducts. The ^{14}C-erythritol bile-plasma ratio was significantly lower in bile collected from the side with the extrahepatic bile duct (0.98 ± 0.03) than in bile from the other side of the liver (1.22 ± 0.07, $p<0.05$). About 10% of total hepatic bile flow originated in the extrahepatic bile ducts in the fed state. The bicarbonate ^{14}C-erythritol concentration ratio was significantly higher in bile from the side with the extrahepatic bile ducts ($p<0.05$). Bicarbonate-bile acid, and bicarbonate-bilirubin concentration ratios were also significantly higher in bile from the side of the liver with the extrahepatic ducts. The extrahepatic bile ducts have a physiologically significant role in the secretion of bile water. Bicarbonate is secreted in association with water in the extrahepatic ducts.

0153 THE SYNTHESIS AND EXCRETION OF NONERYTHROID BILIRUBIN IN THE DOG.

(Eng.) Bergan, A.; Ostrem, T.; Enge, I. (Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 12(5): 605-609; 1977.

To investigate the synthesis and excretion of nonerythroid bilirubin, sequential samples of arterial, portal, and liver blood, as well as of bile and thoracic duct lymph, were analyzed for bilirubin and nonbilirubin radioactivity following the injection of labeled δ-aminolevulinic acid (^{14}C-ALA, 90-125 µCi, i.v.). After 2 min, only about 15% of the injected radioactivity was found in the plasma. In systemic blood, the first nonerythroid, radioactive bilirubin was detected within 10 min after the injection, and maximum radioactivity was found between 30 and 75 min after precursor injection. In those dogs in which simultaneous liver vein and aortic blood samples were taken, radioactive bilirubin was detected at the same time in the two vascular compartments. The concentration of radioactive bilirubin in the liver vein blood was, however, always lower than that in aortic blood. Lymphatic and bile bilirubin radioactivity was demonstrated at 30 min after the ^{14}C-ALA injection. The fact that the nonerythroid bilirubin is detected in plasma before it appears in the bile excludes enterohepatic circulation. Radioactive bilirubin in the lymph was not only later in appearance than that in the plasma, but also lower in concentration than that in the plasma of dogs with intact biliary passages; these results exclude the possibility that the liver lymphatics are of any importance in the transport of nonerythroid bilirubin from the liver to the blood. Evidence for a direct canalicular excretion of the nonerythroid bilirubin synthesized in the liver was found by comparing the curves for bilirubin and nonbilirubin radioactivity in the lymph and in the bile. In the bile, there was no time lag between nonbilirubin and bilirubin radioactivity. This excludes the possibility that the first bilirubin to appear in the bile is secondary to that in the blood, as was the case for lymph. Like the synthesis of bilirubin in the liver, the process of conjugation is known to be very rapid. These steps should not represent any substantial delay in bilirubin excretion. Thus, nonerythroid bilirubin synthesized in the liver seems to be excreted directly to the bile and does not recirculate through the blood.

0154 ENZYMATIC CONVERSION OF BILIRUBIN MONOGLUCURONIDE TO DIGLUCURONIDE BY RAT LIVER PLASMA MEMBRANES.

(Eng.) Jansen, P. L. M.; Chowdhury, J. R.; Fischberg, E. B.; Arias, I. M. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *J. Biol. Chem.* 252(8):2710-2716; 1977.

The conversion of bilirubin monoglucuronide to bilirubin diglucuronide was studied in subcellular fractions of rat liver. The highest specific activity for bilirubin diglucuronide formation occurred in a fraction highly enriched in plasma membranes. Studies of reaction stoichiometry and utilization of UDP-D-[^{14}C]glucuronic acid revealed that conversion of bilirubin monoglucuronide to bilirubin diglucuronide is not catalyzed by UDP-glucuronyltransferase, and results from transglucuronidation of bilirubin monoglucuronide, with formation of bilirubin diglucuronide and unconjugated bilirubin. When unconjugated bilirubin was infused i.v. into rats at rates exceeding the maximal hepatic excretory capacity, bilirubin monoglucuronide accumulated in serum, and bilirubin diglucuronide was found exclusively in bile as the predominant bilirubin metabolite. These results suggest that the formation of bilirubin diglucuronide occurs at the surface membrane of the liver cell. Conversion of bilirubin monoglucuronide to bilirubin diglucuronide may play a role in the transport of bilirubin glucuronides from liver to bile.

0155 ALTERATIONS PRODUCED IN THE ENDOPLASMIC RETICULUM BY CARBON TETRACHLORIDE. (Eng.)

Smuckler, E. A. (Dept. Pathology, Univ. Washington, Seattle, WA 98195). *Panminerva Med.* 18(9/10):292-309; 1976.

Factors concerning carbon tetrachloride hepatotoxicity are reviewed. The evidence suggests that carbon tetrachloride is metabolized within the hepatocyte. This biochemical modification appears to take place within the endoplasmic reticulum, with a production of proximate toxins that modify cell function and, more specifically, appear to modify the function of the endoplasmic reticulum itself. Both modification of the anabolic function of the membrane and decreased capacity to form proteins, both for cell use and for export, is easily detectable. The injury is associated with a disaggregation of the ribosome-messenger amino acyl-transfer RNA complex, so that essentially "nascent" ribosomes are present. This is not associated with alteration of protein synthesis or with formation of messenger RNA or its transport or lifetime in the cytoplasm. The alteration within the cell sap and within the membrane surface suggests that the active product associated with the change is not localized solely to the endoplasmic reticulum. The modification of the activity of the membranous structure of the endoplasmic reticulum is also not uniform, but rather punctate. This is consistent with the notion that there are "hot spots" that seem to be affected by this toxin and are represented by modifications of these structures and functions. The question of whether the most severe and the most lasting changes are those that appear in the fatally injured cells has not been answered. Although this seems to be true for protein synthesis detected by autoradiography, no simple technique has been provided to carry out a similar study for the membranous components of the endoplasmic reticulum. While it is evident that these modifications are important and potentially meaningful for the maintenance of cellular function, an explanation of their interaction with cellular physiology has not been put forth. Furthermore, it is not known whether this model will provide detailed evidence for mechanisms potentially available and important in the modification of cell structures by other halogenated hydrocarbons.

0156 EARLY ALTERATIONS INDUCED BY CARBON TETRACHLORIDE IN THE LIPIDS OF THE MEMBRANES OF THE ENDOPLASMIC RETICULUM OF THE LIVER CELL: II. DISTRIBUTION OF THE ALTERATIONS IN THE VARIOUS LIPID FRACTIONS. (Eng.)

Benedetti, A.; Casini, A. F.; Ferrali, M.; Comporti, M. (Istituto di Patologia Generale dell'Universita di Siena, Via Laterino 8, 53100 Siena, Italy). *Chem. Biol. Interact.* 17(2):167-183; 1977.

The distribution of the molecular alterations produced by CCl_4 in the various phospholipids of the microsomal membrane was studied to investigate the functional membrane damage caused by the halogenated hydrocarbon. Analysis of various phospholipid moieties showed that phosphatidyl ethanolamine (PE) has the highest diene conjugation absorption, followed by phosphatidyl serine (PS) and phosphatidyl inositol (PI); all show the "D" spot in chromatography. The phosphatidyl choline (PC) fraction contained only a minor absorption of conjugated dienes and no "D" spot. A decrease in arachidonic acid (20:4) content was found in PE ($p<0.05$), while no change in fatty acid pattern occurred in PC or neutral lipids. Quantitative estimation of fatty acid methyl esters of various lipid fractions was done by irreversible binding of ^{14}C from $^{14}CCl_4$ to various lipid classes. PS had the highest specific activity, while PC had the least irreversible binding of CCl_4 free radicals. Thin-layer chromatography of the PS fraction showed that only 11% of the radioactivity was associated with pure PS moiety, while the lipid fraction containing the remaining radioactivity could be an oxidation product. It is suggested that following CCl_4 intoxication, the free radical attack occurring in the PE fraction initiates an intense lipoperoxidation process. In conclusion, the various phospholipid fractions of liver microsomal lipids are affected differently by CCl_4 poisoning.

0157 CARBON TETRACHLORIDE ACTIVATION, LIPID PEROXIDATION, AND THE MIXED FUNCTION OXYGENASE ACTIVITY OF VARIOUS RAT TISSUES. (Eng.)

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Carbon tetrachloride activation, lipid peroxidation, and mixed function oxidase activity were examined in the microsomal fraction of the liver and other tissues from male and female Sprague-Dawley rats. When fasted (12-14 hr) rats were inoculated i.p. with a solution of $^{14}CCl_4$ (27.5 mCi/mmol) in olive oil [14 x 10^6 disintegrations/min (dpm)/ml] in a volume of 5 ml/kg and were then sacrificed 3 hr later, the levels of irreversibly bound ^{14}C to microsomal lipids in male liver, female liver, and pregnant female liver were 1,225 ± 266, 729 ± 78, and 666 ± 330 x 10^3 dpm/g lipid, resp. The corresponding $^{14}CCl_4$ tissue concentrations were 5 ± 1, 5 ± 1, and 8 ± 4 dpm/g tissue, resp. The ratio between the irreversible binding of ^{14}C to microsomal lipids and the free $^{14}CCl_4$ concentration was significantly higher in these liver microsomal fractions than in other tissue microsomal fractions tested, including the kidney. Lipid peroxidation values in microsomal fractions from various tissues 3 hr after fasted rats were given 1 ml/kg of CCl_4 i.p. (expressed as absorbance at 243 nm x 1,000 for a solution containing 1 mg of microsomal lipid/ml) were 285 ± 30, 225 ± 20, and 251 ± 32 for the male liver, female liver, and pregnant female liver, resp., compared to control values of 176 ± 24, 132 ± 10, and 185 ± 42, resp. These differences were statistically significant ($p<0.01$). Lipid peroxidation did not occur after CCl_4 administration in the other tissues tested. There was generally a good correlation between CCl_4 activation in the liver (and other tissues) and cytochrome P-450 content, which measured 0.65 ± 0.23, 0.39 ± 0.06, and 0.09 ± 0.04 nmol/mg protein in the male liver, female liver, and pregnant female liver, resp. No correlation between CCl_4 activation and cytochrome c reductase activity was found. These results suggest that cytochrome P-450 is involved in CCl_4 activation and that irreversible binding of CCl_4 metabolites to cellular components, rather than lipid peroxidation, is responsible for the biochemical and/or ultrastructural tissue lesions due to CCl_4 intoxication.

0158 CIRRHOSIS OF THE LIVER IN RABBITS INDUCED BY A HIGH CHOLESTEROL DIET--AN EXPERIMENTAL MODEL. (Eng.) Gupta, P. P.; Tandon, H. D.; Ramalingaswami, V. (Dept. Veterinary Pathology, Punjab Agricultural Univ., Ludhiana, India). *Indian J. Med. Res.* 64(10):1516-1526; 1976.

Hepatic changes induced in rabbits fed different regimens of high cholesterol diet for a prolonged period of time were studied, and the possible use of these regimens for the study of fatty liver and its evolution into cirrhosis is described. The sequence of changes on continuous cholesterol feeding was: fatty change, which was initially centrilobular, but later became diffuse, with simultaneous accumulation of cholesterol in the parenchymal cells; diffuse portal fibrosis; and eventually "portal" cirrhosis of the monolobular type. Liver cell necrosis seemed to have contributed little to the pathogenesis of cirrhosis. The fibrosis was mainly related to the mesenchymal cell activity in the portal canals. There was no significant regression of changes when cholesterol was withdrawn from the diet after 8 weeks of feeding. One of four animals developed cirrhosis 20 weeks after withdrawal. The precise mechanism of fibrosis and cirrhosis is not understood, but excessive accumulation of cholesterol in the liver probably acts as a cirrhogenic factor. The morphological sequences of the cholesterol-induced portal cirrhosis provide a useful experimental model for the study of the mechanism of cirrhosis, using an endogenous agent, without mediation of nutritional deficiencies.

0159 LIVER DAMAGE FROM COCAINE IN MICE. (Eng.) Shuster, L.; Quimby, F.; Bates, A.; Thompson, M. L. (Tufts Univ. Sch. Medicine, Boston, MA 02111). *Life Sci.* 20(6):1035-1042; 1977.

The effects of cocaine on liver histology, serum transaminase activity, and *in vivo* drug metabolism were studied in mice. Four daily injections of cocaine hydrochloride (20 mg/kg) in B6AF$_1$/J mice produced focal necrosis of liver parenchymal cells in the midzonal region and a fivefold increase in SGOT. Massive liver damage and marked SGOT elevation (from a normal level of 78 ± 8.5 Karmen U [KU]/ml to as high as 25,000 KU/ml) was observed after a single injection of 50 mg/kg cocaine-HCl. This damage led to increased sleep time after pentobarbital, and a decreased rate of pentobarbital metabolism *in vivo*. The results indicate that cocaine is a potent hepatotoxic agent in mice.

0160 UPTAKE AND DEGRADATION OF ^{125}I-LABELLED ASIALO-FETUIN BY ISOLATED RAT HEPATOCYTES. (Eng.) Tolleshaug, H.; Berg, T.; Nilsson, M.; Norum, K. R. (Sch. Medicine, Univ. Oslo, Blindern, Oslo 3, Norway). *Biochim. Biophys. Acta* 499(1): 73-84; 1977.

The uptake and degradation of ^{125}I-labeled asialo-fetuin was studied in isolated rat liver cells, and the distribution of this asialo-fetuin between hepatocytes and nonparenchymal liver cells was examined after i.v. injection. ^{125}I-labeled asialo-fetuin was taken up by a saturable process. Half-maximum uptake was seen at about 3 x 10^{-8} M asialo-fetuin. Nonparenchymal liver cells did not take up asialo-fetuin *in vitro*. The rate of uptake of asialo-fetuin exceeded the rate of degradation at all concentrations of asialo-fetuin tested. Asialo-fetuin consequently accumulated in the cells until the extracellular supply was exhausted. Asialo-fetuin degradation could be studied without concurrent uptake by incubating cells, previously exposed to asialo-fetuin, in asialo-fetuin-free medium. Degradation, as evidenced by increase in acid-soluble radioactivity, was inhibited by NH_4Cl and chloroquine. The change with time in the intracellular distribution pattern of radioactivity in cells that had been exposed to ^{125}I-labeled asialo-fetuin for 10 min was examined by means of differential centrifugation. Initially, the radioactivity was found mostly in the microsomal fraction. One hour after the exposure to labeled protein, the distribution pattern of radioactivity resembled that of the lysosomal enzyme β-acetylglucosaminidase. It is possible that asialo-fetuin digestion takes place in lysosomes.

0161 EFFECT OF DICHLOROACETATE AND GLUCAGON ON THE INCORPORATION OF LABELED SUBSTRATES INTO GLUCOSE AND ON PYRUVATE DEHYDROGENASE IN HEPATOCYTES FROM FED AND STARVED RATS. (Eng.) Claus, T. H.; Pilkis, S. J. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232). *Arch. Biochem. Biophys.* 182 (1):52-63; 1977.

The effects of dichloroacetate on the conversion of various labeled substrates into glucose, as well as its effect on pyruvate dehydrogenase activity, were studied in the isolated hepatocytes of fed and fasted rats. Dichloroacetate (2 mM) stimulated the conversion of [1-^{14}C]lactate to glucose in hepatocytes from fed rats. In hepatocytes from rats starved for 24 hr, where the mitochondrial NADH/NAD$^+$ ratio is elevated, dichloroacetate inhibited the conversion of [1-^{14}C]lactate to glucose. Dichloroacetate stimulated $^{14}CO_2$ production from [1-^{14}C]lactate in both cases. It also completely activated pyruvate dehydrogenase and increased flux through the enzyme. The addition of β-hydroxybutyrate, which elevates the intramitochondrial NADH/NAD$^+$ ratio, changed the metabolism of [1-^{14}C]lactate in hepatocytes from fed rats to a pattern similar to that seen in hepatocytes from starved rats. Thus, the effect of dichloroacetate on labeled glucose synthesis from lactate appears to depend on the mitochondrial oxidation-reduction state of the hepatocytes. Glucagon (10 nM) stimulated labeled glucose synthesis from lactate or alanine in hepatocytes from both fed and starved rats and in the absence or presence of dichloroacetate, but the hormone had no effect on pyruvate dehydrogenase activity whether or not the enzyme had been activated by dichloroacetate. It appears, then, that pyruvate dehydrogenase is not involved in the hormonal regulation of gluconeogenesis. Glucagon inhibited the incorporation of 10 mM [1-^{14}C]pyruvate into glucose in hepatocytes from starved rats. Although this inhibition has been previously attributed to an inhibition of pyruvate dehydrogenase by the hormone, dichloroacetate did not prevent the inhibition of glucose synthesis, nor did glucagon alter the activity of pyruvate dehydrogenase in homogenates of cells that had been incubated with 10 mM pyruvate in the absence or presence of dichloroacetate. It is concluded that the inhibition by glucagon of pyruvate gluconeogenesis is not due to an inhibition of pyruvate dehydrogenase.

0162 THE ROLE OF METHIONINE IN GLUTATHIONE BIOSYNTHESIS BY ISOLATED HEPATOCYTES. (Eng.) Reed, D. J.; Orrenius, S. (Dept. Biochemistry and Biophysics, Oregon State Univ., Corvallis, OR 97331). *Biochem. Biophys. Res. Commun.* 77(4): 1257-1264; 1977.

The role of methionine and cysteine in glutathione synthesis was studied in rat hepatocytes after experimental *in vivo* depletion of liver glutathione. Hepatocytes freshly isolated from diethylmaleate (0.6 mmol/kg, i.p.)-treated rats were shown to perform net biosynthesis of intracellular glutathione at approximately an *in vivo* rate. ^{35}S from ^{35}S-cysteine or ^{35}S-methionine each contributed to the formation of glutathione to about the same extent, up to 75% and 61%, resp., depending upon the amino acid concentration in the medium. The sulfur atom of methionine makes a significant contribution to the synthesis of the thiol of glutathione, probably via the formation of cystathionine.

0163 HALOTHANE HEPATOTOXICITY: ENHANCEMENT BY POLYCHLORINATED BIPHENYL PRETREATMENT. (Eng.) Reynolds, E. S.; Moslen, M. T. (Univ. Texas Medical Branch, Galveston, TX 77550). *Anesthesiology* 47(1):19-27; 1977.

Halothane hepatotoxicity was studied in male Sprague-Dawley rats pretreated with polychlorinated biphenyl (Aroclor 1254, 150 µmol/kg, 7 days). Within 2 hr of the end of anesthesia (0.85% for 5 hr), the SGOT and SGPT levels were increased to above normal, and morphologic injury was recognized in the centrilobular parenchymal cells of the pretreated animals. Necrosis of the centrilobular hepatocytes was prominent within 24 hr. The ultrastructure of the hepatic tissue at intervals after anesthesia indicated that the injury primarily involved the endoplasmic reticulum (ER), progressing from dispersion of the rough ER to vacuolization of the rough ER and coalescence of the smooth compenents of this membranous system into tubular aggregates. These changes were preceded by selective deactivation of the mixed-function oxidase components, cytochrome P-450 and zoxazolamine hydroxylase, and early transient increases in conjugated dienes of lipids. Although pretreatment with Aroclor 1254 potentiated halothane hepatotoxicity, neither covalent binding of labeled halothane to liver proteins nor excretion of water-soluble labeled metabolites in the urine was enhanced 24 hr after the i.p. administration of a low nonhepatotoxic or high hepatotoxic dose of ^{14}C-1-labeled halothane (10 and 10,000 µmol/kg, resp.). These findings suggest that the toxic pathway(s) for the biotransformation of halothane do not involve increased production of water-soluble or protein-bound metabolites.

0164 INCREASE OF SERUM VERY LOW DENSITY LIPOPROTEINS IN RATS AFTER ADMINISTRATION OF α-HEXACHLOROCYCLOHEXANE. (Eng.) Grajewski, O.; Oberdisse, E. (Pharmakologisches Institut der Freien Universitat Berlin, Thielallee 69/73, D-1000 Berlin 33, Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 298(2):129-135; 1977.

The effect of α-hexachlorocyclohexane (α-HCH) on serum lipids and lipoproteins was studied in female Wistar rats. After enteral administration of 200 mg/kg α-HCH the rats developed hyperlipemia. Forty-eight hours after the administration, serum triglycerides were increased by 300%, whereas both serum cholesterol and serum total phospholipids only increased by about 45%. Serum free fatty acids were not significantly altered. Fractionation of the serum lipoproteins by ultracentrifugation showed that the hyperlipemia was due to a fivefold increase in serum very low density lipoproteins. Hepatic triglyceride secretion, calculated after i.v. injection of Triton WR 1339, was increased in animals pretreated with α-HCH. Corresponding to this observation, drugs known to diminish the triglyceride secretion of the liver, such as actinomycin D, cycloheximide, glucagon, orotic acid, CFT 1201, and CFT 1042 reduced the α-HCH-induced hyperlipemia. It is concluded that hyperlipoproteinemia after α-HCH is due to an increased hepatic very low density lipoprotein secretion. Blood sugar level was decreased in fasting animals after α-HCH treatment. Earlier experiments suggest that this effect is due to a decreased gluconeogenesis in the liver.

0165 TOXIC EFFECTS OF INDOCYANINE GREEN ON RAT LIVER MITOCHONDRIA. (Eng.) Laperche, Y.; Oudea, M. C.; Lostanlen, D. (Hopital Henri Mondor, 94010 Creteil, France). *Toxicol. Appl. Pharmacol.* 41(2):377-387; 1977.

Experiments were carried out to determine whether the decrease in bile flow seen in the rat after the administration of indocyanine green (ICG) at rates exceeding the maximal capacity of hepatic transport is dependent on ICG's effects on liver mitochondria. ICG (68-171 nmol/mg protein) inhibited the oxygen consumption of rat liver mitochondria *in vitro*. In state IV respiration, an acceleration of oxygen consumption occurred prior to this inhibition. ICG induced mitochondrial swelling in an isotonic KCl and K^+ acetate medium but not in a 0.27 M sucrose medium. The increase in the ^{42}K diffusion space of isolated mitochondria was significantly larger than that of the ^{14}C sucrose diffusion space, indicating that ICG renders the mitochondrial membrane permeable to K^+ ions. At the same time, an efflux of H^+ ions from mitochondria was observed. The inhibition of mitochondrial oxygen consumption could be the result of a decrease in substrate penetration, as suggested by the diminution in NAD reduction by glutamate or isocitrate in the presence of ICG, without change in the activity of the corresponding dehydrogenases. A nigericin-like-mediated K^+ for H^+ antiport is proposed to account for the effects of ICG upon mitochondrial membrane permeability.

0166 EFFECTS OF ANESTHETIC AGENTS ON THE BILIARY EXCRETION OF IOPANOATE IN THE RAT.

(Eng.) Cooke, W. J.; Cooke, L. (Univ. Massachusetts Medical Sch., 55 Lake Ave. North, Worcester, MA 01605). *Drug Metab. Dispos.* 5(4):377-385; 1977.

The effects of three anesthetics (ether, pentobarbital, and urethane) and decerebration on the metabolism and the biliary excretion following iopanoate administration were compared in Sprague-Dawley rats. Following the administration of ^{125}I-iopanoate glucuronide (13 μmol/kg, i.v.), its biliary excretion was 65% lower in animals anesthetized with ether than in those anesthetized with urethane (800 mg/kg, i.p.); when a high dose of iopanoate (169 μmol/kg) was administered, the difference was less marked but still significant ($p<0.01$). Biliary excretion of iopanoate glucuronide in animals anesthetized with pentobarbital (45 mg/kg, i.p.) was intermediate to that in animals anesthetized with ether and urethane. Decerebrate animals excreted iopanoate glucuronide at rates indistinguishable from those in animals anesthetized with urethane. The variations in biliary excretion of iopanoate glucuronide were accompanied by changes in the plasma decay of iopanoate. The positive relationship between the hepatic and plasma concentrations of iopanoate was unaffected by the anesthetic agent used. Ether significantly decreased the hepatic iopanoate glucuronide/iopanoate ratio, when compared with animals anesthetized with urethane or with decerebrate animals. The relation between the hepatic content of iopanoate glucuronide and the biliary excretion of iopanoate glucuronide was not affected by the anesthetic. The biliary excretory process appears to be saturable with an apparent V_{max} for iopanoate glucuronide of 4 μmol/min/kg and an apparent K_m of 1 μmol/g liver. These data indicate that the hepatic metabolism of iopanoate to iopanoate glucuronide is depressed by ether and by pentobarbital anesthesia in comparison to urethane anesthesia or decerebration.

0167 EFFECT OF ESSENTIAL AND NONESSENTIAL FATTY ACIDS IN COMPLEX MIXTURE ON FATTY ACID COMPOSITION OF LIVER LIPIDS.

(Eng.) Caster, W. O.; Andrews, J. W., Jr.; Mohrhauer, H.; Holman, R. T. (Sch. Home Economics, Univ. Georgia, Athens, GA 30602). *J. Nutr.* 106(12):1809-1816; 1976.

The fatty acid composition of liver lipids was determined and was related to that of diet lipids fed to weanling rats for 60 days. The diet lipids constituted 5% of diet and were fed in the form of 24 different fatty acid ethyl ester mixtures containing 10 major fatty acids proportioned so that the intake of each one was poorly correlated with the intake of the remainder. The correlation coefficient between the amount of fatty acid in the diet and in the liver lipids was close to zero, except for linoleate and docosahexanoate acids (laurate, myristate, oleate). Linoleate fed in lipid mixtures was more effective in raising the concentration in liver lipids than previous studies had shown when the fatty acid was fed alone. The nutritional requirement for linoleate, an essential fatty acid, and the dose-response curve of liver concentration was similar when linoleate was fed in mixtures and alone. It is concluded that each of the polyunsaturated fatty acid components fed in a complex mixture behaves as expected from observations in experiments with diets containing lipids in the form of limited numbers of pure esters.

0168 DIFFERENTIAL EFFECTS OF DIETARY METHYL ESTERS OF LONG-CHAIN SATURATED AND POLYUNSATURATED FATTY ACIDS ON RAT LIVER AND ADIPOSE TISSUE LIPOGENESIS.

(Eng.) Clarke, S. D.; Romsos, D. R.; Leveille, G. A. (Dept. Food Science and Human Nutrition, Michigan State Univ., East Lansing, MI 48824). *J. Nutr.* 107(7):1170-1181; 1977.

Four experiments were conducted to investigate the influence methyl esters of $C_{16:0}$, $C_{18:0}$, $C_{18:1}$, $C_{18:2}$, and $C_{18:3}$ fatty acids exert on rat liver and adipose tissue fatty acid synthesis and related enzymes when supplemented to a fat-free (FF) diet. A randomized complete block design, in which rats were matched for body weight and food intake, was used. Rats previously adapted to a meal-eating regimen (access to food from 0900-1200 hr) were fed a FF diet for 7 days prior to the addition of the respective dietary fatty acids. In experiments 1 to 3, all esters were supplemented at a level of 3% of the daily FF diet allotment. The apparent absorbabilities of $C_{16:0}$ and $C_{18:0}$ were 40% and 35%, resp., while the values for $C_{18:1}$, $C_{18:2}$, and $C_{18:3}$ were 88%, 87%, and 89%, resp. In comparison with the FF dietary treatment, polyunsaturated fatty acids ($C_{18:2}$ and $C_{18:3}$) reduced the rate of hepatic fatty acid synthesis and the activities of hepatic fatty acid synthetase (FAS) and malic enzyme (ME) in three of four experiments. In all four experiments, glucose-6-phosphate dehydrogenase (G6PD) activity was significantly depressed by $C_{18:2}$ and $C_{18:3}$. $C_{18:1}$ produced an intermediate rate of *in vitro* liver fatty acid synthesis, but exerted no significant effect on hepatic lipogenic enzyme activities. Adding $C_{16:0}$ or $C_{18:0}$ to the FF diet had no depressive effect on hepatic fatty acid synthesis, but $C_{18:0}$ supplementation was associated with a significant increase in hepatic FAS, G6PD, and ME activities. Neither unsaturated nor saturated fatty acids affected adipose tissue FAS, G6PD, The lack of influence of $C_{16:0}$ and $C_{18:0}$ may have been partially due to their poor absorbability. Therefore, a level of 7% $C_{16:0}$ supplementation was compared with 3% $C_{18:2}$ or $C_{18:3}$. This resulted in comparable amounts of fatty acid absorbed. Both $C_{18:2}$ and $C_{18:3}$ addition to the FF diet were equally effective in significantly depressing *in vivo* hepatic fatty acid synthesis, and in decreasing FAS, G6PD, and ME activities by more than 50%. $C_{16:0}$ had no suppressive action on liver fatty acid synthesis or related enzyme activities. Adipose tissue lipogenesis remained unchanged by dietary fat treatment. These data demonstrate that $C_{18:2}$ and $C_{18:3}$ specifically inhibit rat liver fatty acid synthesis, independent of carbohydrate intake. Under these conditions adipose tissue lipogenesis was unaffected by low levels of dietary fat, regardless of the degree of unsaturation.

0169 THE EFFECT OF DIETARY LIPID PEROXIDES, STEROLS AND OXIDISED STEROLS ON CYTOCHROME P450 AND OXIDATIVE DEMETHYLATION IN THE ENDOPLASMIC RETICULUM.

(Eng.) Lambert, L.; Wills, E. D. (St. Bartholomew's Hosp., Charterhouse Square, London ECIM 6BQ, England). *Biochem. Pharmacol.* 26(15):1417-1421; 1977.

The effects of dietary linoleate, oxidized linoleate, lipid peroxides, cholesterol, cholesterol hydroperoxides, and squalene on the concentration of cytochrome P450 and rate of oxidative demethylation were examined in the endoplasmic reticulum of the rat liver. Addition of 5% methyl linoleate to a diet containing 5% lard caused a large increase in the rate of oxidative demethylation. Oxidized methyl linoleate (5%) was much less effective and also depressed the rate of oxidation when added to a diet containing corn oil. A supply of dietary linoleic acid or other polyunsaturated fatty acids is essential for maximum rate of oxidative demethylation in the endoplasmic reticulum and for maximum induction by phenobarbitone. Dietary lipid peroxide did not increase the rate of oxidative metabolism in the endoplasmic reticulum or its induction. Feeding a diet that included 10% herring oil and that contained only 1.7% linoleic acid caused a very rapid rate of oxidative demethylation and a high concentration of cytochrome P450 in the liver endoplasmic reticulum. Induction by phenobarbitone was also very effective after feeding this diet. The unsaponifiable fraction of herring oil, added to the lard diet, effectively increased the rate of oxidative demethylation to a value similar to that observed after feeding a diet containing 10% herring oil. The addition of cholesterol (2 g/kg diet) or of squaline (1 g/kg diet) to diets containing 10% lard were less effective than the unsaponifiable fraction of herring oil, but caused a large increase in the content of cytochrome P450 and rate of oxidative demethylation in the endoplasmic reticulum. The induction of phenobarbitone was also enhanced. Cholesterol hydroperoxide was no more effective than cholesterol. A supply of dietary sterols is essential for maximum activity of oxidative demethylation in the liver endoplasmic reticulum, especially when linoleic acid is in restricted supply, and for maximum induction by phenobarbitone. The nonsaponifiable fraction of herring oil cannot be completely replaced in the diet by pure cholesterol, cholesterol hydroperoxide, or squalene.

0170 LIVER AND STEROID HORMONES. II. INFLUENCING THE HEPATIC METABOLISM BY STEROID HORMONES.

(Ger.) Kley, H. K.; Kruskemper, H. L. (2. Medizinische Klinik, Moorenstrasse 5, D-4000 Dusseldorf 1, W. Germany). *Med. Klin.* 72(7): 231-239; 1977.

Studies on relationships between steroid hormones and the liver are reviewed. Cortisol was found to induce the activity of such hepatic enzymes as tryptophan pyrrolase, tyrosine transaminase, pyruvate-glutamate transaminase, pyruvate carboxylase, phosphoenolpyruvate carboxykinase, fructose-1,6-diphosphatase, glucose-6-phosphatase, and glucogen synthetase. No glycogen synthesizing enzymes were found in the liver of adrenalectomized, fasting animals. Twenty percent of patients with Cushing's syndrome have an increased blood glucose level, and 90% show pathological blood sugar load tests. Estrogens increase the hepatic DNA and RNA levels and increase and modify the activity of hepatic enzymes, such as glucose-6-phosphate dehydrogenase and delta-aminolevulinic acid synthetase. Estrogens increase the liver glycogen level, the plasma insulin, total lipid, triglyceride, free fatty acid, cholesterol, and lipoprotein concentrations, and the glycolytic capacity of the liver. The concentrations of practically all specific hormone-binding proteins are increased by estrogens and gestagens, and reduced by androgens. Testosterone increases the activity of fumarate hydratase, transaminase, and delta-amino acid oxidase.

0171 EFFECTS OF CONTRACEPTIVE STEROIDS AND PREGNANCY ON BILE COMPOSITION AND KINETICS IN THE BABOON.

(Eng.) Morrissey, K.; Panveliwalla, D.; McSherry, C.; Deitrick, J.; Niemann, W.; Gupta, G. (New York Hosp.-Cornell Medical Center, New York, NY 10021). *J. Surg. Res.* 22(6):598-604; 1977.

The effect of the contraceptive steroids, ethinylestradiol (EE) and Norethindrone (NET), and of pregnancy on bile acid metabolism was studied in the baboon, an animal that spontaneously forms predominantly cholesterol gallstones as does man. The contraceptive steroids were administered continuously (EE, 65 µg/day; NET, 100 µg/day) via solid Silastic pellets implanted s.c. in the abdomen or sternal region of five baboons (1 male) according to the following protocol: EE, 8 weeks; EE+NET, 10 weeks; NET, 8 weeks. Seven female baboons were used for the pregnancy studies performed prior to and after pregnancy as well as during the second and third trimesters. Gallbladder bile was aspirated percutaneously after a 16-hr fast and on alternate days after i.v. injection of isotopically-labeled bile acids. The response to synthetic sex hormones and to pregnancy was similar: a significant ($p<0.01$-0.05) decrease occurred in biliary cholesterol level and in chenodeoxycholic acid pool size and synthesis rate. When pregnancy had ended or the estrogen component of the contraceptive steroids (EE) was removed, these values reverted to control or antepartum levels. As a result of the concomitant increase in deoxycholic acid pool size, there was no net change in total bile acid pool size during any of the periods of administration of EE or EE+NET, but there was a significant ($p<0.05$) decrease during the third trimester of pregnancy. Over the past 5 yr, a 6% incidence of cholelithiasis among 219 female baboons has been observed, but none occurred in the present study.

0172 INFLUENCE OF DIETARY FAT ON FATTY LIVERS OF CHOLINE-DEFICIENT RATS. (Eng.)

Carroll, C.; Williams, L. (Agricultural Experiment Station, Univ. Arkansas, Fayetteville, AR 72701). *J. Nutr.* 107(7):1263-1268; 1977.

The influence of the type of dietary fat on the nature and severity of liver lipid changes induced by low choline diets was investigated in male weanling rats. Beef tallow, a blend of tallow and safflower oil, or safflower oil (SO) each provided 48% of total energy value of a control diet (0.20 g choline chloride/100 g diet) and a low choline diet (no added choline). Livers from choline-deficient rats fed tallow, blend, or SO diets contained approximately 4.5, 5, and 2.5 times as much lipid, resp., as livers from corresponding control groups. Liver lipids from rats fed SO diets, as compared with those from rats fed tallow diets, contained lower percentages of saturated and mono-unsaturated fatty acids, and higher percentages of polyunsaturated fatty acids. Values for groups fed blend diets were intermediate, except for 18:0 and 20:4 in the control group. Choline deficiency resulted in significant increases in proportions of the predominant fatty acid(s) of the dietary fat in liver lipids (but not in fat pad lipids) at the expense of 18:0 and 20:4. Ratios of 16:0 to 18:0 in both liver and fat pad lipids were greater in choline-deficient rats than in corresponding control groups, probably reflecting greater fatty acid synthesis.

0173 REVERSAL OF OROTIC ACID-INDUCED FATTY LIVER IN RATS BY CLOFIBRATE. (Eng.)

Novikoff, P. M.; Edelstein, D. (Albert Einstein Coll. Medicine, 1300 Morris Park Ave., Bronx, NY 10461). *Lab. Invest.* 36(2):215-231; 1977.

Morphologic observations and biochemical and immunoelectrophoretic results of the reversal of orotic acid-induced fatty liver by clofibrate (CPIB) are presented. The addition of 1% orotic acid to a sucrose-enriched semipurified diet resulted in markedly fatty liver when fed to rats for 7-22 days. Light microscopy revealed lipid droplets distributed throughout the cytoplasm of all hepatocytes. Electron microscopy showed that all the endoplasmic reticulum (ER) was broken into vesicles. Within the interior (cisterna) of each vesicle, one or more lipid droplets were present. Morphologic signs of normal lipid transport (ER to Golgi apparatus to space of Disse) disappeared. The Golgi elements were flattened and lacked very low density lipoprotein particles; the Golgi-derived secretory vacuoles were not present. Biochemical analyses showed an increase in hepatic triacylglycerol levels, to approximately 8 times the levels of sucrose-fed controls by the 7th day, 18 times by the 15th day, and 25 times by the 22nd day. Hepatic cholesterol levels increased two- to fourfold. Serum triacylglycerol levels fell markedly, and serum cholesterol levels were reduced. The apoprotein B component of plasma lipoproteins was practically absent at 7 days and increased slightly at 22 days. By 8-16 days after adding CPIB (0.25%) to the diet, the ER of the hepatocytes returned to its usual parallel configuration, and lipid droplets were not seen within its cisternae. Morphologic features of normal lipid transport reappeared. Lipid-containing residual bodies were common. Peroxisomes were more numerous than in hepatocytes of control rats. Liver triacylglycerol levels approached sucrose-fed control levels, and serum triacylglycerol levels returned to chow-fed control levels. Hepatic cholesterol levels were similar to those of sucrose-fed and chow-fed controls, whereas serum cholesterol levels were lower. Serum apoprotein B levels returned to chow-fed control levels. A sequence of events terminating in the removal of lipid from the hepatocytes is suggested by observation of morphologic changes following CPIB administration.

0174 THE PHARMACOKINETIC PATTERN OF PENTOBARBITAL IN HEPATIC DAMAGE. (Ger.)

Ossenberg, F. W. (I. Med. Abt., Allg. Krankenhaus Barmbek, Rubenkamp 148, 2000 Hamburg 60, W. Germany). *Z. Gastroenterol.* 15(6):393-403; 1977.

The kinetic pattern of distribution and elimination of pentobarbital (PB) was tested in rats with hepatic damage and in 21 patients with liver cirrhosis. After i.v. injection of PB in normal rats, the PB blood level curve showed a dual exponential decreasing course. After total hepatectomy, an initial decrease of PB blood level occurred, corresponding to the distribution of the drug in the body. Thereafter, the PB blood level remained constant, since PB was no longer eliminated due to lack of a liver. Microsomal PB metabolizing liver enzymes and the rate of elimination of PB were reduced in rats after portacaval anastomosis alone or by arterialization of the liver (end-to-end anastomosis between the renal artery and the stump of the portal vein); the cytochrome P450 content of the liver and PB clearance were significantly reduced. Presumably, a hepatotrophic factor in the portal vein blood is necessary for the normal functioning of the hepatic microsomal enzyme system. Rats with extrahepatic cholestasis induced by ligation of the bile ducts had a significantly reduced PB clearance and a decreased initial volume of distribution. PB elimination and initial volume of distribution were significantly reduced in some of the 21 patients with liver cirrhosis; the cause of this disorder has not yet been elucidated. When the rate of PB metabolism is reduced, a delayed action of the drug must be expected. Repeated administration may lead to accumulation in the body.

0175 INDUCTION OF HEPATIC MONO-OXYGENASE SYSTEMS OF PREGNANT RATS WITH PHENOBARBITAL AND 3-METHYLCHOLANTHRENE.

(Eng.) Guenthner, T. M.; Mannering, G. J. (Univ. Minnesota Medical Sch., Minneapolis, MN 55455). *Biochem. Pharmacol.* 26(1): 577-584; 1977.

The selective mechanism governing induction of hepatic mono-oxygenase systems in adult rats during pregnancy was studied. Rats were injected i.p. daily for 4 days with sodium phenobarbital (40 mg/kg in saline), 3-methylcholanthrene (16 mg/kg in corn oil), or progesterone (50 mg/kg in corn oil) in a volume of 2 ml/kg. Ethylmorphine *N*-demethylase, a cytochrome P-450-dependent system, was induced about fourfold in nonpregnant rats but only twofold in pregnant rats when phenobarbital was administered alone. Also the induction of microsomal cytochrome P-450 was about half that observed with nonpregnant rats ($p<0.05$). This impairment of phenobarbital induction occurred within 3 days of conception and disappeared within 5 days after parturition. 3-Methylcholanthrene given alone produced no increase in ethylmorphine metabolism. The depressed response of the maternal liver to phenobarbital induction was partially reversed by the co-administration of 3-methylcholanthrene. The administration of a higher dose (80 mg/kg/day for 4 days) of sodium phenobarbital (PB 80) overcame the pregnancy-related lowered response to phenobarbital induction observed with smaller dose (40 mg/kg/day for 4 days) of the barbiturate (PB 40). Ethylmorphine demethylation in moles HCHO/g/liver/hr was 5.12 ± 0.7 in PB 40 pregnant rats and 11.32 ± 1.2 in PB 80 pregnant rats, which compared to the nonpregnant rats PB 40 value of 11.3 ± 1.4. Progesterone (50 mg/kg) lowered the induction of cytochrome P-450 ($p<0.05$), but induction of mono-oxygenase activity was not lowered. The similarity in responses of the maternal and fetal livers to inducing agents suggests that a common regulatory mechanism operates both in the fetus and in pregnant female rats.

0176 EFFECT OF HYPOPHYSECTOMY ON THE STIMULATION OF LIVER GROWTH BY α-HEXACHLOROCYCLOHEXANE, PHENOBARBITAL, AND PARTIAL HEPATECTOMY IN THE RAT.

(Eng.) Schulte-Hermann, R.; Landgraf, H.; Koransky, W. (Institut fur Toxikologie und Pharmakologie der Philipps-Universitat Marburg, Pilgrimstein 2, D-3550 Marburg a.d. Lahn, W. Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 298(2):137-142; 1977.

Studies were carried out to determine whether the hypophysis or its hormones are involved in the stimulation of liver cell proliferation elicited by α-hexachlorocyclohexane (α-HCH), phenobarbital (PB), or partial hepatectomy. In hypophysectomized CFHB rats, α-HCH (200 mg/kg, 15-17 days after hypophysectomy and 100 mg/kg 4, 7, and 8 days later) and PB (80 mg/kg on 4 consecutive days from day 18-20 after hypophysectomy and 100 mg/kg on the following 4 days) induced an increase in liver mass, but no increase in liver DNA. Hypophysectomy without additional treatment resulted in a decrease of liver size and RNA, while the DNA content remained unchanged, thereby leading to a relative DNA surplus. One-third hepatectomy in hypophysectomized animals led to a small increase of hepatic DNA only; after two-thirds hepatectomy, 75-80% of the original liver DNA was restored. In rats with an intact hypophysis, losses of liver DNA are known to be restored completely. The findings suggest that the relative DNA surplus in hypophysectomized rats prevents the stimulation of DNA synthesis by weak growth stimuli such as α-HCH, PB, and one-third hepatectomy. If the relative DNA surplus is eliminated by partial hepatectomy, the inducers do produce DNA multiplication. It is concluded that the induction of liver growth and cell multiplication by α-HCH and PB does not require the presence of the hypophysis or one of its hormones.

0177 INDUCTION OF HEPATIC MONO-OXYGENASE SYSTEMS IN FETAL AND NEONATAL RATS WITH PHENOBARBITAL, POLYCLINIC HYDROCARBONS AND OTHER XENOBIOTICS.

(Eng.) Guenthner, T. M.; Mannering, G. J. (Natl. Inst. Child Health and Human Development, NIH, Bethesda, MD 20014). *Biochem. Pharmacol.* 26(7):567-575; 1977.

The hepatic P-450 hemoprotein-dependent mono-oxygenase systems were studied in fetal and neonatal Sprague-Dawley rats born to mothers injected throughout pregnancy with a number of exogenous agents (sodium phenobarbital, 3-methylcholanthrene, dieldrin, chlordane, DDT, 2,4,5-trichlorophenoxyacetic acid [2,4,5-T], α- and β-naphthoflavone, benzo[a]pyrene, dibenz[a,c]anthracene, 3β-hydroxy-20-oxopreg-5-ene-16α-carbonitrile [PCN], and 2-diethylaminoethyl-2,2-diphenylvalerate [SKF 525-A]). Microsomal preparations were made from livers collected on days 13, 16, and 18-22 postconception and 23-25 days postpartum. Phenobarbital (total dose, 80 mg/kg) did not induce the cytochrome P-450-dependent mono-oxygenase activities, aminopyrine or ethylmorphine *N*-demethylase in the fetal liver. Benzo(a)pyrene hydroxylase activity, a cytochrome P$_1$-450-dependent mono-oxygenase activity, was induced in fetal liver by 3-methylcholanthrene (16 mg/kg). All three enzymes were active in neonatal liver. When 3-methylcholanthrene, SKF 525-A, PCN, or dibenz(a,c)-anthracene were administered with phenobarbital, the apparent suppression of phenobarbital-induced mono-oxygenase activities in the fetal liver was partially reversed. The other inducing agents tested were inactive in reversing the suppression. It is concluded that a control mechanism operates in the fetal rat that selectively suppresses induction of cytochrome P-450 but not P$_1$-450 synthesis. Certain pharmacological agents can reverse this suppression.

0178 LONG-TERM STUDIES ON CHEMICALLY INDUCED LIVER ENLARGEMENT IN THE RAT. I. SUSTAINED INDUCTION OF MICROSOMAL ENZYMES WITH ABSENCE OF LIVER DAMAGE ON FEEDING PHENOBARBITONE OR BUTYLATED HYDROXYTOLUENE.

(Eng.) Crampton, R. F.; Gray, T. J. B.; Grasso, P.; Parke, D. V. (British Industrial Biological Res. Assoc., Woodmansterne Rd., Carshalton, Surrey, England). *Toxicology* 7(3):289-306; 1977.

As part of a study on the relationships between liver enlargement, induction of drug metabolizing enzymes, and certain forms of liver damage, sequential biochemical and morphological observations were made on the livers of female Wistar rats fed diets containing 0.4% butylated hydroxytoluene (BHT) or 0.25% phenobarbitone for up to 80 weeks. Both compounds increased the relative liver weight by 35% and 34% with BHT and phenobarbitone, resp., and produced marked enhancement of the activities of ethylmorphine *N*-demethylase, aniline 4-hydroxylase, biphenyl 4-hydroxylase, and NADPH-cytochrome c reductase and of the contents of cytochromes P-450 and b_5 and microsomal protein (by 95%, 15%, 91%, 32%, 83%, 78%, and 50%, resp.). These changes were evident after 1 week of treatment and persisted until treatment was stopped after 80 weeks. The only morphological changes observed throughout the treatment period were centrilobular cell enlargement and hypertrophy of the smooth endoplasmic reticulum. Histochemical examination revealed a centrilobular depression of glucose-6-phosphatase, but there was no disturbance of the normal pericanalicular distribution of lysosomes. All changes observed with either compound were reversible on cessation of treatment at week 80. These results support the concept that liver enlargement accompanied by induction of drug metabolizing enzymes represents an adaptive response, and they provide a basis for the interpretation of pathological changes developing in the enlarged liver unaccompanied by drug metabolizing enzyme induction.

0179 LONG-TERM STUDIES ON CHEMICALLY INDUCED LIVER ENLARGEMENT IN THE RAT. II. TRANSIENT INDUCTION OF MICROSOMAL ENZYMES LEADING TO LIVER DAMAGE AND NODULAR HYPERPLASIA PRODUCED BY SAFROLE AND PONCEAU MX.

(Eng.) Crampton, R. F.; Gray, T. J. B.; Grasso, P.; Parke, D. V. (British Industrial Biological Res. Assoc., Woodmansterne Rd., Carshalton, Surrey, England). *Toxicology* 7(3):307-326; 1977.

A long-term study with Safrole and Ponceau MX was carried out in female Wistar rats to determine whether changes in hepatic drug metabolizing enzyme activity are correlated with the development of liver injury. Sequential biochemical and morphological observations were made on the livers of rats fed a diet containing 0.25% safrole or 1.0% Ponceau MX for up to 85 weeks. After the administration of safrole for 7 days, the relative liver weight was increased by 20% above the control value, and the activity of the drug metabolizing enzymes was enhanced by 75-210%. This enzyme induction was short-lived, however, and continued administration of safrole led to inhibition of drug metabolizing activity. Despite this, the liver remained enlarged, and concentrations of NADPH-cytochrome c reductase, cytochrome b_5, and microsomal protein were markedly elevated. During the initial phase of enzyme induction, no histochemical or morphological abnormalities were evident, but the loss of this inductive response was associated with histochemical and ultrastructural evidence of liver damage. The enlarged liver produced by Ponceau MX was initially accompanied by moderate induction of the drug metabolizing enzymes, followed by a gradual reversal as treatment continued. Histochemical evidence of liver damage was encountered after only 1 week of treatment. The early cytological changes produced by both compounds were followed by the development of fatty change, cell necrosis and, ultimately, hepatic nodules. Liver enlargement unaccompanied by induction of the drug metabolizing enzymes may provide an early index of hepatotoxicity.

0180 SYNTHESIS OF GLYCOPROTEINS IN THE GOLGI COMPLEX OF THE MOUSE GALLBLADDER EPITHELIUM DURING FASTING, REFEEDING, AND GALLSTONE FORMATION: A LIGHT MICROSCOPIC AUTORADIOGRAPHIC AND QUANTITATIVE ELECTRON MICROSCOPIC STUDY.

(Eng.) Wahlin, T. (Dept. Histology and Pathology, Univ. Umea, S-901 87 Umea, Sweden). *Histochemistry* 51(2/3): 133-140; 1977.

The mouse gallbladder epithelium was studied during fasting, refeeding, and experimental gallstone formation to establish if quantitative and qualitative variations in food intake in mice are reflected in the incorporation pattern of radioisotope into epithelial cell glycoproteins and in morphological changes at the site of glycoprotein synthesis, i.e., in the Golgi complexes of the gallbladder principal cells. Control gallbladder epithelium, examined after an intraperitoneal injection of $[^3H]$galactose (0.1 mCi) showed labeling of the supranuclear Golgi region in all normal principal cells at 10 min and an increased radioactivity throughout the apical cytoplasm at 25 min. At 40 min, after $[^3H]$galactose injection, silver grains were mainly present at the cell surface. Autoradiographs processed 25 min after $[^3H]$galactose injection that followed a 48-hr fast showed decreased supranuclear and apical radioactivity. After refeeding (12 hr), there was an enhanced activity in both these regions, roughly equal to the activity observed in controls. Animals fed a lithogenic diet for one month showed a marked increase of radioactivity, mainly in cells of crypts and invaginations of the gallbladder mucosa. Morphometric measurements of the Golgi apparatus revealed that deprivation of food reduced to 2.7% ($p<0.01$) and refeeding restored (to 4.2%, $p<0.05$) the volume density of the Golgi apparatus. In the course of gallstone formation there was a further increase to 6.4% ($p<0.001$) in the volume density of the Golgi complexes as compared to that in controls (4.4%). It is concluded that the synthesis of glycoproteins in the mouse gallbladder principal cells is dependent both on the nutritional state of the mice and the qualitative composition of the diet given to the animals.

0181 ENDOGENOUS INHIBITORS OF PROTEIN SYNTHESIS IN ISCHAEMIC LIVERS. (Eng.) Bernelli-Zazzera, A. (Istituto Patologia Generale, Via Mangiagalli 31, 30133 Milano, Italy). *Panminerva Med.* 18(9/10):326-331; 1976.

Factors leading to the conclusion that the inhibition in protein synthesis seen in the ischemic liver is due to endogenous inhibition are reviewed. The interruption of the blood supply impairs protein synthesis in various cellular or cell-free preparations from ischemic livers (tissue slices, post-mitochondrial supernatants, microsomes, isolated polysomes, cell sap). This inhibition depends on the decay of many metabolic reactions and structures involved in the pathway of protein synthesis. Ribosomal RNA decreases; polysomes break down; there is an actual drop in the number of active particles, rather than a proportional loss of functional capacity of all the ribosomes; and ribosome-membrane relationships become looser. In the cell sap, the activity of both synthetases and transferases is reduced. In ischemic cells, the energy to drive the reaction of protein synthesis is drastically lowered, due to mitochondrial damage. Initiation of new peptides seems to be mainly inhibited, but there is also evidence of impairment of elongation of the initiated chains. At least some of the changes in protein synthesis are related to the increase in concentration of endogenous metabolites, such as ADP, AMP, NADH, and other unidentified molecules accumulating in ischemic liver cells, and possibly to changes in the ratios that describe the "energy state" and the "redox state" of the liver cell.

0182 COMPARATIVE STUDY OF PROTOPORPHYRINS IN ERYTHROPOIETIC PROTOPORPHYRIA AND GRISEOFULVIN-INDUCED MURINE PROTOPORPHYRIA. BINDING AFFINITIES, DISTRIBUTION, AND FLUORESCENCE SPECTRA IN VARIOUS BLOOD FRACTIONS. (Eng.) Poh-Fitzpatrick, M. B.; Lamola, A. A.; Zalar, G. L.; Weinstein, M.; Doleiden, F.; Freeman, M. (Columbia Univ. Coll. Physicians and Surgeons, New York, NY 10032). *J. Clin. Invest.* 60(2):380-389; 1977.

The use of griseofulvin-induced murine protoporphyria (GFPP) as a model for erythropoietic protoporphyria (EPP) and the use of tissue localization of protoporphyrin(s) (PP) as a criterion for the tissue source of PP were assessed in Sprague-Dawley mice. Stroma from GFPP mice and EPP patients contained only a small fraction (0.5%) of the total RBC PP. Thus, 99.5% of the PP was associated with the cytosol hemoglobin (Hb) in both cases. The close agreement in PP distribution among the plasma, stroma, and Hb pools failed to help define any difference in sites of PP overproduction in GFPP and EPP. However, as shown by fractionation of RBC into populations of progressive age on discontinuous density gradients, PP distributions among RBC of different ages are diametrically opposed in GFPP and EPP. The murine RBC became more PP-laden with age in circulation, but there was a rapid loss of PP with age in EPP. Direct competition experiments showed that PP binds about 40 times more strongly to human Hb than it does to human serum albumin (HSA). The molar ratio of Hb to HSA is about 6:1. Assuming that all other plasma sites contribute to PP binding as importantly as HSA, the ratio of PP bound to Hb:PP bound to plasma proteins at equilibrium can be expected to be at least 120:1. This strong affinity can provide the driving force necessary for the net diffusion of PP from the plasma to the intracellular Hb in GFPP mice and it can explain the buildup of the high RBC PP levels. The opposite rapid efflux of intra-RBC PP into plasma occurs despite this strong Hb affinity, implying continuous, efficient clearance of PP from the plasma by the liver. These and other data suggest that liver-formed PP cannot significantly contribute to the circulating PP pool.

0183 THE HEPATIC HANDLING OF ^{131}I-LABELED SULFOBROMOPHTHALEIN IN THE DOG. COMPARISON WITH SULFOBROMOPHTHALEIN. (Eng.) Glasinovic, J. C.; Delage, Y.; Erlinger, S. (Hopital Beaujon, 100, Boulevard du General Leclerc, 92110 Clichy, France). *Biomedicine [Express]* 25(7):255-258; 1976.

The influence of added radioiodine on the hepatic extraction and biliary excretion of BSP was studied in dogs. Two types of experiments were performed. In the first, a compartmental analysis of BSP and ^{131}I-labeled BSP disappearance curves was performed after the simultaneous injection of BSP (5 mg/kg) and ^{131}I-labeled BSP (10 μCi). Both the plasma to liver and liver to bile transfer rates were significantly lower for ^{131}I-labeled BSP than for BSP; the liver to plasma transfer rates were not significantly different. In the second series of experiments, the hepatic uptake of BSP and ^{131}I-labeled BSP was estimated by the multiple indicator dilution technique. The extraction of BSP (59 ± 5%) was significantly higher than that of ^{131}I-labeled BSP (35 ± 5%, $p<0.001$). The labeling of BSP with ^{131}I significantly modifies the hepatic handling of the dye; ^{131}I-labeled BSP thus cannot be used as a tracer of BSP.

0184 HEPATIC UPTAKE AND BILIARY EXCRETION OF DIBROMOSULPHTHALEIN. ALBUMIN DEPENDENCE, INFLUENCE OF PHENOBARBITAL AND NAFENOPIN PRETREATMENT AND THE ROLE OF Y AND Z PROTEIN. (Eng.) Meijer, D. K. F.; Vonk, R. J.; Keulemans, K.; Weitering, J. G. (Bloemsingel 1, Groningen, Netherlands). *J. Pharmacol. Exp. Ther.* 202(1): 8-21; 1977.

The hepatic uptake and biliary excretion of 3,6-bromphenolphthalein-disulfonate (DBSP) in perfusion studies was compared with *in vivo* DBSP kinetics, and an attempt was made to establish a possible role of Y (ligandin) and Z proteins in the hepatic uptake, storage, and excretion of this anion. The uptake and excretion of DBSP was studied in isolated perfused rat livers from control rats and from rats pretreated with phenobarbital (90 mg/kg, for 6 days) or with nafenopin (200 mg/kg, for 2 days). The flow rates of perfusate in control and treated groups were kept equal. Hepatic content of Y and Z proteins was determined by dye binding using gel filtration. DBSP was found to be associated with both Y and Z proteins in liver cytosol. DBSP clearance was studied using various concentrations of bovine albumin in the perfusion medium. Clearance was monoexponential with 3.0% albumin and under this condition mainly reflects biliary excretion of DBSP. At concentrations of 1.0%, 0.5%, and 0.2% albumin, a distinct biexponential plasma disappearance curve was found, from which rate constants for transfer from plasma to liver (K_{12}), liver to plasma (K_{21}), and liver to bile (K_{23}) were calculated. K_{12} was enhanced and K_{21} was lowered with decreasing albumin concentrations, whereas K_{23} was not affected. Phenobarbital treatment increased Y protein concentration twofold and left Z protein unchanged; nafenopin pretreatment slightly elevated Y protein and increased Z protein concentration threefold. With perfusate with 1% albumin, K_{12} was unchanged and K_{23} was increased in the phenobarbital experiments, whereas K_{21} was reduced. In the livers from nafenopin-pretreated rats, K_{21} was reduced and K_{12} and K_{23} were unchanged. Data on binding of DBSP at various albumin concentrations indicate that primary hepatic uptake (K_{12}) and reflux (K_{21}) both are influenced by variations in plasma albumin concentration but are not directly related to the free drug concentration. Phenobarbital pretreatment does not lead to an acceleration of primary hepatic uptake, a result possibly related to the flow-standardized condition compared with the *in vivo* situation. Induction of Y and Z proteins possibly contributes to the lower reflux of DBSP from liver into plasma, an effect that was also observed in the rat *in vivo*.

0185 CHANGES IN RENAL FUNCTION AND WATER-SALT METABOLISM IN RATS DURING INDUCTION OF TOXIC LIVER CIRRHOSIS. (Rus.) Gapon, L. I. (Chernovtsy Medical Inst., Chernovtsy, USSR). *Patol. Fiziol. Eksp. Ter.* (3):82-84; 1977.

0186 PECULIARITIES ASSOCIATED WITH THE DEVELOPMENT OF EXPERIMENTAL HEPATOCHOLECYSTITIS IN SUCKLING RABBITS. (Rus.) Tarakhovsky, M. L.; Lukyanova, E. M.; Emaikina, V. P.; Denisova, M. F.; Oleshko, L. D. (Kiev Scientific Res. Inst. Pediatrics, Obstetrics, Gynecology, Kiev, USSR). *Patol. Fiziol. Eksp. Ter.* (3):72-74; 1977.

0187 EFFECTS OF L-ARGININE HYDROCHLORIDE ADMINISTRATION ON THE DISTURBANCES OF LIVER GLUTAMINE METABOLISM FOLLOWING ACUTE AMMONIA INTOXICATION IN THE RAT. (Fre.) Petit, M. A.; Nordmann, J.; Nordmann, R. (INSERM, U-72, Hopital de la Salpetriere, 47, Boulevard de l'Hopital, F-75013 Paris, France). *Arch. Int. Physiol. Biochim.* 85(2):367-375; 1977.

0188 FREE FATTY ACIDS AND CHOLESTEROL AS POSSIBLE PARTICIPANTS IN REACTIONS OF FREE RADICAL OXIDATION OF LIPIDS IN ANIMAL TISSUES. (Rus.) Terekhova, S. F.; Burlakova, E. B.; Elizarova, T. I. (Inst. Chemical Physics, Acad. Sciences USSR, Moscow, USSR). *Vopr. Med. Khim.* 23(3):375-381; 1977.

0189 EFFECT OF LOCAL CARBAMATE ANESTHETICS ON MORPHOLOGICAL STRUCTURES OF THE LIVER AND SOME ENZYMES IN VIVO. (Cze.) Foltinova, J.; Helia, O. (Faculty Medicine, Univ. Komenskeho, Sasinkova 4, 884 24 Bratislava, Czechoslovakia). *Biologia* 32(3):195-207; 1977.

0190 SIGNIFICANCE OF THE HOUR-LONG SECRETION METHOD OF LIVER BILE DETERMINATION. (Rus.) Maximov, V. A.; Galkin, V. A. (No affiliation given). *Vrach. Delo* (2):107-109; 1977.

0191 RESISTANCE OF VARIOUS FORMS OF CYTOCHROME P-450 OF RAT LIVER TO THE ACTIONS DESTABILIZING THE MICROSOMAL MEMBRANE. (Rus.) Gromova, O. A.; Zakharova, N. E.; Lyakhovich, V. V.; Tsyrlov, I. B. (Inst. Clinical and Experimental Medicine, Siberian Branch USSR Acad. Medical Sciences, Novosibirsk, USSR). *Biull. Eksp. Biol. Med.* 83(5):553-555; 1977.

0192 FEATURES PECULIAR TO THE ACTION OF SODIUM AUROTHIOMALATE IN ACUTE TOXIC HEPATITIS. (Rus.) Korolenko, T. A.; Shkurupy, V. A.; Subbotin, V. M.; Yakobson, G. S. (Novosibirsk Medical Inst., Novosibirsk, USSR). *Biull. Eksp. Biol. Med.* 83(5): 539-542; 1977.

0193 EFFECT OF LOWERING OF PROTEIN LEVEL IN THE DIET ON THE TOXICITY OF BUTYLHYDROXYTOLUENE (BHT) IN THE RAT: PART II. ACTIVITY OF SELECTED ENZYMES IN A SUBACUTE EXPERIMENT. (Pol.) Nikonorow, M.; Karlowski, K. (Zakladu Badania Zywnosci i Przedmiotow Uzytku Panstwowego Zakladu Higieny, Warsaw, Poland). *Panstw. Zakl. Hig.* 28(3):225-236; 1977.

0194 HEXOBARBITAL-OXIDATION IN VIVO AND IN VITRO IN RATS WITH BILE DUCT LIGATION OR ANIT-CHOLESTASIS. (Ger.) Brachtel, D.; Gallenkamp, H.; Richter, E. (Medizinischen Universitatsklinik, Josef-Schneider-Str. 2, 8700 Wurzburg, W. Germany). *Z. Gastroenterol.* 15(6):378-380; 1977.

0195 TUMORIGENESIS FOLLOWING EXPERIMENTAL LITHIASIC CHOLECYSTITIS, WITH OR WITHOUT ADDED CARCINOGENS, IN MICE. (Fre.) Besancon, F.; Marche, C.; Habar, J. L.; Parrot, J.; Damianakis, N. (Clinique et Semiologie Medicales, Hotel-Dieu, Parvis Notre-Dame, 75004 Paris, France). *Ann. Gastroenterol. Hepatol.* 13(3):195-207; 1977.

0196 ROLE OF THE LIVER IN HORMONE METABOLISM AND IN REGULATION OF HORMONE CONTENT IN THE BLOOD. (Rus.) Ghenes, S. G. (Inst. Endocrinology and Hormone Chemistry, Kharkov, USSR). *Arkh. Patol.* 39(6):74-80; 1977.

0197 ULTRASTRUCTURAL CHANGES IN THE LIVER IN EXPERIMENTAL DIFFUSE PERITONITIS. (Rus.) Fishbein, A. V.; Olefir, V. P. (Medical Inst., Lvov, USSR). *Arkh. Patol.* 39(6):49-55; 1977.

0198 SUBMICROSCOPIC CHANGES OF GUINEA PIG HEPATOCYTES TREATED WITH HETEROLOGOUS MITOCHONDRIAL ANTIBODY. (Rus.) Barkhina, T. G.; Tomilets, V. A. (Res. Inst. Human Morphology, USSR Acad. Medical Sciences, Moscow, USSR). *Arkh. Patol.* 39(6):25-29; 1977.

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0201 EFFECT OF ENTERAL OXYGEN THERAPY AND VITAMIN E ON THE SECRETION AND CHEMICAL COMPOSITION OF BILE IN EXPERIMENTAL DYSTROPHY. (Rus.) Skakun, N. P.; Nesterovich, Ya. M. (Ternopol Medical Inst., Ternopol, USSR). *Vopr. Med. Khim.* 23(4):558-562; 1977.

0202 INVESTIGATION INTO THE ACTION OF ROENTGEN-CONTRAST MEDIA ON THE RESPIRATORY CHAIN OF MITOCHONDRIA IN THE LIVER OF RATS. (Rus.) Sergeev, P. V.; Obraztsov, N. V.; Timofeev, A. V.; Khalilov, E. M. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Farmakol. Toksikol.* 40(5): 591-595; 1977.

0203 TEMPORARY PORTACAVAL SHUNTING IN TWO-STAGE LIVER RESECTION. (Rus.) Rusanov, V. P.; Pogorelov, Yu. V.; Golovneva, V. I. (Semipalatinsk Medical Inst., Semipalatinsk, USSR). *Khirurgiia (Mosk.)* (7):20-23; 1977.

0204 EXPERIMENTAL INTENSIFICATION OF THE FUNCTIONAL ACTIVITY OF THE DONOR LIVER. (Rus.) Koperchak, A. M.; Babosh, Yu. L.; Peters, Yu. N. (Kemerovo Medical Inst., Kemerovo, USSR). *Khirurgiia (Mosk.)* (7):31-35; 1977.

0205 EXPERIMENTAL RHEOLOGY OF LIVER PARENCHYMA. (Ger.) Arnold, G.; Gressner, A. M. (Abteilung Anatomie der Rheinisch-Westfalischen Technischen Hochschule, Melatener Strasse 211, D-5100 Aachen, W. Germany). *Biomed. Tech.* 22(7/8): 182-186; 1977.

0206 α-FETOPROTEIN AND ALBUMIN SYNTHESIS BY HUMAN EMBRYO HEPATOCYTES. (Rus.) Eriser, T. L.; Elgort, D. A.; Abelev, H. I. (N. F. Gamaleya Inst. Epidemiology and Microbiology, USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 83(6):711-713; 1977.

0207 POSTVAGOTOMY DIVISION OF STELLATE RETICULOCYTES IN THE LIVER OF RATS. (Rus.) Astakhova, A. M.; Anufriev, B. T. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Biull. Eksp. Biol. Med.* 83(6):738-741; 1977.

0208 THE INFLUENCE OF SUBEXTREME AND EXTREME FACTORS OF THE HEPATIC LYSOSOMAL SYSTEM. (Rus.) Panin, L. E.; Mayanskaya, N. N. (Inst. Clinical and Experimental Medicine, Siberian Branch USSR Acad. Sciences, Novosibirsk, USSR). *Biull. Eksp. Biol. Med.* 83(6):678-680; 1977.

0209 REPLICATION OF DNA ASSOCIATED WITH NUCLEAR ENVELOPE OF REGENERATING RAT LIVER. (Rus.) Dvorkin, V. M.; Kiryanov, G. I.; Vanyshin, B. F. (A. N. Belozersky Lab. Molecular Biology and Bioorganic Chemistry, Moscow State Univ., Moscow, USSR). *Biokhimiia* 42(6):1001-1005; 1977.

0210 DISTURBANCE OF GLYCOLYTIC OXIREDUCTION IN THE LIVER DURING EXPERIMENTAL BURN DISEASE. (Rus.) Slobodin, V. B.; Lifshits, R. I.; Sobolevskaya, T. M. (Ivanovo Medical Inst., Ivanovo, USSR). *Biull. Eksp. Biol. Med.* 34(8):171-173; 1977.

0211 PECULIARITIES OF REGENERATION IN THE LIVER DEPRIVED OF POLYPLOID HEPATOCYTES. (Rus.) Dubovaya, T. K.; Kusch, A. A.; Brodsky, V. Ya. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Biull. Eksp. Biol. Med.* 34(8):221-224; 1977.

0212 DYNAMICS OF THE CHANGES IN BLOOD 11-OXYCORTICOSTEROIDS IN THE SUPRA- AND SUBHEPATIC FORMS OF PORTAL HYPERTENSION. (Rus.) Krivchik, A. A.; Mikhneva, L. M.; Abasheva, G. K. (Minsk Medical Inst., Minsk, USSR). *Patol. Fiziol. Eksp. Ter.* (4):79-82; 1977.

0213 LIVER OF NEWBORN RABBIT AFTER TRANSPLACENTAL EFFECT OF PHENOBARBITAL ADMINISTERED TO PREGNANT RABBIT DURING THE LAST PART OF PREGNANCY. (Pol.) Maryniak, R.; Dydyk, L. (Centrum Medycyny Doswiadczalnej i Klinicznej PAN, ul. Dworkowa 3, 00-784 Warszawa, Poland). *Patol. Pol.* 28(1):125-130; 1977.

0214 CHANGES IN THE ACTIVITY OF GLUTAMICO-ASPARTIC AND GLUTAMICO-ALANINE TRANSAMINASES IN THE LIVER OF RATS IN EXPERIMENTAL THERMAL TRAUMA. (Rus.) Kamilov, F. Kh.; Yakushev, V. S. (Chelyabinsk Medical Inst., Chelyabinsk, USSR). *Patol. Fiziol. Eksp. Ter.* (4):58-61; 1977.

See also, 0042, 0113, 0117, 0124, 0230, 0238, 0240, 0241, 0259, 0261, 0271, 0272, 0277, 0438, 0442, 0490, 0552, 0563, 0573, 0580, 0585, 0587, 0593, 0629, 0646, 0648, 0669, 0670, 0677, 0678, 0687, 0691, 0733.

SECRETION AND METABOLISM

Intestine

0215 THE ORIGIN OF CHYLOMICRON PHOSPHATIDYLCHOLINE IN THE RAT. (Eng.) Mansbach, C. M., II. (Veterans Admin. Hosp., Durham, NC 27710). *J. Clin. Invest.* 60(2):411-420; 1977.

Two pathways of origin of chylomicron phosphatidylcholine (CM PC), *de novo* synthesis and lyso PC-derived PC, were investigated using lymph and bile fistulated Sprague-Dawley rats infused with a stabilized triolein emulsion. To quantitate the contribution of PC generated by lyso PC acyltransferase to CM PC, [^{14}C-glycerol]PC was infused into the duodenum. The percentage of CM PC increased as the concentration of PC was increased in the infusate. Over 4-6 hr, virtually all the CM PC was derived from the PC infused when the infusate PC concentration was 10 mM. None of the infused [^{14}C-glycerol]PC was found in the aqueous phase of the gut luminal contents; i.e., there is minimal liberation of free PC glycerol within the intestinal lumen. There was less incorporation of radiolabel in the lymph subnatant PC, suggesting that CM and lymph subnatant PC are derived from different PC precursor pools. To determine the amount of CM PC synthesized from *de novo* sources, similarly prepared rats were infused with $^{32}P_i$. $^{32}P_i$ incorporation was used to represent *de novo* PC synthesis ultimately via the choline-dependent pathway. As the infusate PC concentration was increased, progressively less CM PC was derived from the infused $^{32}P_i$. Thus, exogenously infused PC inhibits *de novo* PC synthesis. When [^{32}P]bile PC and [^{14}C]-potato PC were infused into rats, the ratio of bile to potato derived PC in the CM averaged 1.72; i.e., bile PC was preferred as a CM PC precursor despite the greater similarity of the saturated fatty acids of potato PC to those of CM PC. The predominant saturated fatty acid of bile PC is palmitite, but palmitate and stearate are nearly equally present in CM PC, suggesting that the former cannot be the preferred precursor of the latter. The results suggest that PC synthesized from either pathway is preferentially distributed into the CM PC precursor pool, compared to the subnatant pool, and that these two pools are different.

0216 STEROL SYNTHESIS IN INTESTINAL VILLI AND CRYPT CELLS OF RATS AND GUINEA PIGS. (Eng.) Muroya, H.; Sodhi, H. S.; Gould, R. G. (Kyoto Univ. Faculty Medicine, Sakyo-ku, Kyoto, Japan). *J. Lipid Res.* 18(3):301-308; 1977.

The role of guinea pig and rat small intestinal villi and/or crypt cells in sterol synthesis was investigated. Three methods were used to measure sterol synthesis: incubation with ^{14}C-acetate of villi, crypt cell, and muscle fractions obtained by the method of graduated scraping, incubation of whole intestine pieces followed by fractionation into the same fractions, and *in vivo* studies in rats injected with ^{14}C-acetate and killed 7-40 min later, after which the intestine was fractionated by scraping or by serial sectioning of frozen tissue. All methods were in agreement in showing sterol synthesis in villi to be as active per mg protein as in crypt cells. Measurements of the isotope content of the total nonsaponifiable lipid fractions led to the same conclusions as did the isotope content of the digitonin-precipitable sterol fractions. For a given period of incubation, the ratio of the two values was the same in villi and crypts, ruling out the possibility of synthesis of sterols in crypts prior to transfer to villi. The fractionation into villi, crypts, and muscle fractions by scraping greatly reduced the total sterol synthetic activity in rat but not in guinea pig small intestine, indicating the hazard of using only this *in vitro* technique to make quantitative estimates of the sterol synthetic capacity of tissue fractions.

0217 EFFECT OF SMALL BOWEL RESECTION ON GASTRIN RELEASE, CATABOLISM, AND ACTIVITY IN DOGS.

(Eng.) Woussen-Colle, M. C.; Brihaye, Cl.; Limbosch, J. M.; De Graef, J. (Hopital Universitaire Saint-Pierre, Rue Haute, 322, B. 1000 Brussels, Belgium). *J. Surg. Res.* 21(4):225-232; 1976.

The effects of upper small bowel resection on the catabolism and activity of gastrin were determined in three dogs prepared with a vagally denervated Heidenhain pouch (HP) and a gastric fistula (GF). Conditions prior to testing varied: starvation, feeding, and infusion of exogenous gastrin. All tests were made before and 1 and 6 months post-resection (PR) of the upper half of the small bowel starting 10 cm from the ligament of Treitz. Continuity was restored by a two-layer end-to-end bowel anastomosis. At 1 month PR, peak acid output over 30 min from the HP was (in mEq, pre-resection values in parentheses): 2.17 ± 0.26 (1.73 ± 0.30), $p<0.05$, in response to exogenous gastrin and 3.62 ± 0.25 (2.20 ± 0.44), $p<0.01$, in response to feeding. The total acid output over 5.5 hr was 29.38 ± 1.67 (12.72 ± 2.41), $p< 0.01$. At 6 months PR, the respective values were 1.89 ± 0.26 ($p>0.05$), 2.62 ± 0.35 ($p>0.05$), and 22.23 ± 3.12 ($p<0.01$). At 1 month PR, immunoreactive serum gastrin levels were 131.7 ± 28.3 pg/ml (41.8 ± 4.0), $p<0.01$; peak gastrin concentration after feeding was 478.3 ± 47.0 pg/ml (144.1 ± 25.0), $p<0.01$, and the integrated gastrin response after feeding was 59.3 ng/ml/5 hr (11.4 ± 2.2), $p<0.01$. At 6 months PR, these values were 65.9 ± 3.7 pg/ml ($p<0.01$), 227.3 ± 33.2 ($p<0.05$), and 24.7 ± 4.0 ng/ml/5 hr ($p<0.01$). The metabolic clearance rate of exogenous gastrin before resection and 1 and 6 months PR was 95.2 ± 11.9, 68.6 ± 8.8 ($p<0.05$), and 107.5 ± 11.2 ($p>0.05$) ml/kg/min, resp. The increased acid response from the HP to a meal PR is due to increased reactivity and increased stimulation of the parietal cells. These effects could be related to the removal of intestinal inhibitors acting on parietal and G cells and/or to the interruption of inhibitory neural reflexes between the small bowel and stomach. In dogs, the small bowel appears to control gastric secretion and gastrin release by humoral and/or neural mechanisms. PR, the mechanism is impaired, but a progressive adaptation takes place, partly as a result of hyperplasia (in the remaining small bowel) of cells catabolizing gastrin and those secreting enterogastrones.

0218 THE INTESTINAL BRUSH BORDER MEMBRANE IN DIABETES: STUDIES OF SUCRASE-ISOMALTASE METABOLISM IN RATS WITH STREPTOZOTOCIN DIABETES.

(Eng.) Olsen, W. A.; Korsmo, H. (William S. Middleton Memorial Veterans Admin. Hosp., Madison, WI 53706). *J. Clin. Invest.* 60(1):181-188; 1977.

To determine the mechanism by which diabetes stimulates the functional activity of the intestinal brush border membrane, the effects of streptozotocin diabetes on the metabolism of one membrane protein, sucrase-isomaltase, was studied in male Sprague-Dawley rats. The protein was purified, and an anti-serum was prepared. Sucrase-isomaltase from control and diabetic rats was immunologically identical as shown by Ouchterlony double-diffusion analysis of papain-solubilized mucosal proteins. The increase in sucrase enzyme activity in diabetic animals (31.0 ± 1.4 U 5 days after streptozotocin versus 13.1 ± 1.0 in controls) was the consequence of increased enzyme protein and was not an alteration in catalytic efficiency, as demonstrated by quantitative immunoprecipitin reactions. To account for increased sucrase-isomaltase protein in diabetes, papain-solubilized mucosal proteins labeled by injection of ^{14}C-carbonate and ^{14}C-leucine were studied. Diabetes did not affect the decay of labeled total protein, but prolonged the decay of labeled sucrase-isomaltase. The half time of sucrase-isomaltase was 4.4 hr in control animals after ^{14}C-carbonate injection and 8.8 and 10.2 hr 2 and 5 days, resp., after induction of streptozotocin diabetes. Similar results were obtained in experiments with ^{14}C-leucine with diabetes increasing the half-time from 6 to 13.6 hr. Diabetes did not appear to increase the rate of addition of sucrase-isomaltase to the brush border membrane, since it did not affect the 10- and 60-min incorporations of isotope into sucrase-isomaltase protein relative to incorporation into total protein and did not alter rate constants for synthesis calculated from the half-time and the change in enzyme mass over time. Thus, enhanced sucrase activity in the diabetic animal is the consequence of an increase in sucrase-isomaltase protein, which develops because of a decrease in its rate of degradation.

0219 SOME OBSERVATIONS ON THE DETERMINATION OF EXTRACELLULAR FLUID VOLUME OF JEJUNAL TISSUE USING [^{3}H]INULIN AND [^{14}C]INULIN.

(Eng.) Dinda, P. K.; Beck, I. T.; Beck, M. (Hotel Dieu Hosp., Kingston, Ontario, Canada). *Can. J. Physiol. Pharmacol.* 55(3):389-393; 1977.

The nature of equilibration of [^{3}H]inulin and [^{14}C]-inulin was examined in the *in vitro* hamster jejunum. Rings of everted jejunum were incubated at 37 C in Krebs-Ringer bicarbonate solution containing 10 mM glucose, tracer amounts of [^{14}C]inulin, and tracer amounts of [^{3}H]inulin from one of the two lots (lot X and lot Y) tested. The incubations were carried out for 5, 10, 20, 30, 45, or 60 min. One lot of [^{3}H]inulin (lot X) provided an estimate of the extracellular (EC) fluid volume which, at all periods of incubation, was comparable with that provided by the [^{14}C]inulin. In contrast, the estimate of EC fluid volume obtained from the other lot of [^{3}H]-inulin (lot Y) was consistently higher than that obtained from the [^{14}C]inulin and increased linearly with the period of incubation. Because, with [^{3}H]-inulin of lot Y, the calculated intracellular (IC) fluid volume decreased linearly with the period of incubation, and because this was not the case with the [^{14}C]inulin or with the [^{3}H]inulin of lot X, it appears that [^{3}H]inulin of lot Y failed to equilibrate within the tissue water, while the other lot of [^{3}H]inulin (lot X), as well as [^{14}C]-inulin, did. Although the EC fluid volume obtained from [^{14}C]inulin (as well as that from [^{3}H]-inulin of lot X) increased progressively, the rate of increase during the first 30 min was considerably higher than that during the last 30 min of incubation. The progressive increase in the $[^{14}C]$-inulin space, however, was accompanied by a corresponding increase in the total water content as well as in the calculated IC fluid content of the tissue. Since the IC fluid volume as percentage of total water content after 5 min of incubation was not significantly different from that after 60 min of incubation, it appears that $[^{14}C]$inulin equilibrates within the EC fluid after 5 min, and that the progressive increase in the calculated EC fluid volume is the result of a corresponding increase in the EC fluid (containing $[^{14}C]$inulin) content of the tissue.

0220 DIFFERENTIATION OF EPITHELIAL CELLS IN HUMAN JEJUNUM: LOCALIZATION AND QUANTIFICATION OF AMINOPEPTIDASE, ALKALINE PHOSPHATASE AND ALDOLASE ISOZYMES IN TISSUE SECTIONS.

(Eng.) Wachsmuth, E. D. (Friedrich Miescher-Institut, P.O. Box 273, CH-4002 Basel, Switzerland). *Histochemistry* 48(2):101-109; 1976.

Aminopeptidase, alkaline phosphatase, and aldolase isozyme activities were studied in human jejunal crypt cells at different stages of differentiation. Jejunal sections were stained histochemically for aminopeptidase and alkaline phosphatase, and the aldolase isozymes were detected with the mixed aggregation immunocytochemical technique. All enzyme concentrations increased from the bottom to the upper part of the crypt. The concentration of aldolase-A per cell was the same in the upper part of the crypt and the villus, whereas the concentration of the other three enzymes was still higher. Therefore, high amounts of aldolase-B, aminopeptidase, and alkaline phosphatase are present in cells highly active in absorption in a fashion similar to that found in the proximal tubule cells of kidney. The relatively undifferentiated cells of the crypts contained both aldolase-A and aldolase-B. Alkaline phosphatase gains its full activity later than aminopeptidase. The synthesis of microvillar membrane enzymes comes to an end earlier than that of the cytosol enzymes.

0221 HCO_3^- AN H^+ SECRETION IN RAT ILEUM IN VIVO.

(Eng.) Podesta, R. B.; Mettrick, D. F. (Dept. Zoology, Univ. Toronto, Ontario M5S 1A1, Canada). *Am. J. Physiol.* 232(6):E574-E579; 1977.

Ion transport was studied in the *in vivo* rat ileum. Replacing Cl^- in the perfusion fluids decreased the luminal pH of perfused ileum. Varying the initial pH in Cl^--depletion studies indicated an equilibrium pH near 6.6. Na^+ depletion in Cl^--depleted fluids partially inhibited luminal acidification. Addition of HCO_3^- accelerated Na^+ absorption and decreased Cl^- absorption. Luminal PCO_2 was increased using fluids buffered to initial pH 6.6, suggesting secretion of HCO_3^- rather than OH^-. The decreased HCO_3^- secretion using Cl^--depleted fluids was not due to an accelerated rate of H^+ secretion. Reaffirmed and expanded in this study is an ileal H^+ secretory process that is partially related to Na^+ absorption and direct HCO_3^- secretion that is related to Cl^- and Na^+ absorption.

0222 Ca IONOPHORE-STIMULATED ION SECRETION IN RABBIT ILEAL MUCOSA: RELATION TO ACTIONS OF CYCLIC 3',5'-AMP AND CARBAMYLCHOLINE.

(Eng.) Bolton, J. E.; Field, M. (Beth Israel Hosp., Boston, MA 02215). *J. Membr. Biol.* 35(2):159-173; 1977.

The possibility that calcium acts as a mediator of secretion in the small intestine was investigated, and experiments were carried out to determine whether cholinergic agonists or serotonin act as calcium ionophores. Addition of the Ca ionophore A23187 (0.5 μg/ml) to the serosal side of stripped rabbit ileal mucosa produced changes in ion transport qualitatively identical with those produced by cyclic 3',5'-AMP (cAMP) and theophylline: an increase in short-circuit current and resistance, net secretion of Cl due both to a decrease in the unidirectional mucosa (*m*) to serosa (*s*) flux and to an increase in the *s* to *m* flux, and net secretion of Na due to a decrease in *m* to *s* flux. Measurements of intracellular cAMP level demonstrated no change following incubation with the ionophore. Removal of Ca from the serosal bathing medium diminished the effects of A23187 but did not impair the action of theophylline. Removal of Ca from both the mucosal and serosal bathing media by replacing it with Sr completely abolished the potential difference response to A23187. These results suggest that the ionophore elicits its secretory actions by decreasing Ca influx into the epithelial cells. In a similar way, carbamylcholine and serotonin, secretagogues known to have no effect on intracellular cAMP level in intestinal mucosa, were shown to be dependent on extracellular Ca to produce their full electrical response. In contrast, the secretagogues vasoactive intestinal peptide and prostaglandin E_1, which raise cAMP concentration in intestinal mucosa, do not appear to require external Ca. Ca may be an intracellular mediator of intestinal ion and water secretion, and some intestinal secretagogues may act as Ca ionophores.

0223 ISOLATION AND IMMUNOCHEMICAL AND CHEMICAL CHARACTERIZATION OF CARCINOEMBRYONIC ANTIGEN-LIKE SUBSTANCES IN COLON LAVAGES OF HEALTHY INDIVIDUALS.

(Eng.) Egan, M. L.; Pritchard, D. G.; Todd, C. W.; Go, V. L. W. (Dept. Microbiology, Univ. Alabama in Birmingham, University Station, Birmingham, AL 35294). *Cancer Res.* 37(8):2638-2643; 1977.

Material with carcinoembryonic antigen (CEA)-like activity, isolated from colon lavages of healthy individuals, was chemically characterized. The CEA-like activity was purified by gel filtration on Sepharose 6B and Sephadex G-200 and by affinity chromatography on concanavalin A linked to Sepharose. The purified material migrated in polyacrylamide-sodium dodecyl sulfate electrophoresis as a single diffuse band with mobility identical with that of tumor CEA. The material with CEA activity from tumor tissue and from normal colon lavages gave lines of identity in double diffusion experiments and had similar inhibition curves with essentially the same specific activities in a radioimmune assay for tumor CEA. The amino acid and carbohydrate compositions were similar to that observed for CEA tumor preparations. Lysine was the single amino terminus. Methylation analysis demonstrated that the monosaccharide linkages were similar to those in CEA isolated from tumor tissue. The data support the view that CEA is not restricted to fetal and neoplastic tissue but is also present in healthy adult tissue.

0224 FUNCTIONAL AND MORPHOLOGICAL STUDIES ON INTESTINAL MUCOSA OF THE RAT UNDER CHRONIC GLUCAGON APPLICATION. (Ger.) Lorenz-Meyer, H.; Menge, H.; Riecken, E. O. (Medizinische Universitatsklinik, Mannkopffstrasse 1, D-3550 Marburg/Lahn, W. Germany). *Res. Exp. Med.* 170(2):181-192; 1977.

0225 RECEPTORS FOR VASOACTIVE INTESTINAL PEPTIDE (VIP) IN ENTEROCYTES: SPECIFIC BINDING AND STIMULATION OF CYCLIC AMP. (Fre.) Laburthe, M.; Besson, J.; Hui Bon Hoa, D.; Rosselin, G. (Hopital Saint-Antoine, 184, rue du Faubourg Saint-Antoine, 75571 Paris Cedex 12, France). *C. R. Acad. Sci. [D] Paris* 284(21):2139-2142; 1977.

0226 INFLUENCE OF DIETARY LACTOSE ON THE INITIATION OF LACTOSE ACTIVITY IN THE DIGESTIVE TRACT OF PIGS. (Fre.) Aumaitre, A.; Fevrier, C.; Dewulf, H. (Station de Recherches sur l'Elevage des Porcs, 78350 Jouy-en-Josas, France). *C. R. Acad. Sci. [D] Paris* 284(21):2135-2138; 1977.

0227 EFFECT OF DIETS OF VARYING PROTEIN CONTENT ON NUCLEIC ACIDS OF THE INTESTINAL MUCOSA. (Ukr.) Malyzheva, T. D.; Okunev, V. N. (Inst. Nutrition Hygiene, Kiev, USSR). *Fiziol. Zh.* 22(4):518-522; 1976.

0228 COMPARATIVE ANALYSIS OF CELL POPULATION OF ENTEROCYTES IN VARIOUS PARTS OF THE SMALL AND LARGE INTESTINE OF RATS. I. PARAMETERS OF THE MITOTIC CYCLE AND HETEROGENEITY OF THE PROLIFERATING ENTEROCYTE POPULATION. (Rus.) Pozharissky, K. M.; Klimashevsky, V. F.; Gushchin, V. A. (Res. Inst. Oncology, Leningrad, USSR). *Tsitologiia* 19(3):303-317; 1977.

0229 COMPARATIVE ANALYSIS OF CELL POPULATION OF ENTEROCYTES IN VARIOUS PARTS OF THE SMALL AND LARGE INTESTINE OF RATS. II. THE RATE OF ENTEROCYTE MIGRATION: GENERAL CONCLUSION AND DISCUSSION. (Rus.) Pozharissky, K. M.; Klimashevsky, V. F.; Gushchin, V. A. (Res. Inst. Oncology, Leningrad, USSR). *Tsitologiia* 19(3):318-328; 1977.

0230 EVIDENCE OF AN ENTEROHEPATIC CYCLE FOR S-CARBOXYMETHYLCYSTEINE. (Fre.) Servin, A. (Laboratoire Joullie, 20 bis, quartier Boieldieu, La Defense, 92803 Puteaux, France). *C. R. Soc. Biol. (Paris)* 171(1):39-42; 1977.

See also, 0002, 0008, 0011, 0014, 0017, 0019, 0021, 0039, 0046, 0113, 0119, 0232, 0233, 0235, 0236, 0237, 0245, 0250, 0263, 0270, 0271, 0280, 0281, 0350, 0428, 0435, 0765.

GENERAL

0231 ULTRASTRUCTURAL CHANGES IN THE GASTRIC MUCOSA FOLLOWING HEMORRHAGIC SHOCK IN PIGS. (Eng.) Collan, Y.; Kivilaakso, E.; Kalima, T. V.; Lempinen, M. (Second Dept. Pathology, Univ. Helsinki, Helsinki, Finland). *Circ. Shock* 4(1):13-25; 1977.

Ultrastructural changes in the gastric mucosa of 14 piglets subjected to transient hemorrhagic shock (3-hr duration, mean arterial pressure 40 mm Hg) were studied. After 30 min, there was mucosal edema and extravasation of RBC. Microthrombi with degranulating thrombocytes and fibrin strands were seen in the capillaries. These changes were also seen in the antral mucosa. At this stage the cells of the neck region of the gastric glands showed mitochondrial dilatation, and their apical parts were seen to bulge into the lumen of the gastric glands. Other cell types were affected later and necrosis progressed from the surface into deeper parts of the mucosa. Mast cells and mucosal endocrine cells were relatively resistant, being mostly undamaged at the end of the shock period and later. The findings suggest that, during the shock, local formation of thrombi contributes to mucosal ischemia and ulcer formation, and that the cells at the neck region of the gastric glands form the locus of limited resistance to ulcerogenic effects.

0232 'LUMINAL NUTRITION' VERSUS 'FUNCTIONAL WORK-LOAD' AS CONTROLLERS OF MUCOSAL MORPHOLOGY AND EPITHELIAL REPLACEMENT IN THE RAT SMALL INTESTINE. (Eng.) Clarke, R. M. (Faculty

Medicine, Univ. Newcastle, Newcastle, N.S.W. 2308, Australia). *Digestion* 15(5):411-424; 1977.

The relation of small intestinal morphology and epithelial replacement to the secretory and absorptive workload that the epithelium performs was investigated in albino male Wistar rats. Isotonic solutions of substrate were infused into surgically unrestrained rats that fed normally via the "intestine-in-continuity." Infusion of glucose, galactose, or NaCl all caused a local increase in villus height, while α-methyl glucoside and mannose had no effect. Glucose, galactose, and α-methyl glucoside all stimulated a similar increase in counts of vincristine metaphases in microdissected crypts, although the absolute level of cell production was lower throughout the gut in glucose-infused rats. Sodium chloride infusion also caused a small stimulation of cell production locally, but a considerable increase in the uninfused intestine-in-continuity. Mannose infusion had a variable effect on cell nutrition" (nutrients in the lumen) as a controller of epithelial replacement in the rat small intestine, and suggest that a mechanism based on the workload of the epithelium may be more appropriate.

0233 THE PRODUCTION OF AN UNUSUAL TISSUE REACTION IN RABBIT BOWEL INJECTED WITH CROHN'S DISEASE HOMOGENATES. (Eng.) Simonowitz, D.; Block, G. E.; Riddell, R. H.; Kraft, S. C.; Kirsner, J. B. (Dept. Surgery, Univ. Chicago, 950 E. 59th St., Chicago, IL 60637). *Surgery* 82(2):211-218; 1977.

Attempts were made to reproduce evidence of a transmissible factor in Crohn's disease. Twenty New Zealand White rabbits received inoculum of tissue homogenates from the terminal ileum of normal subjects and patients with ulcerative colitis or Crohn's disease. This inoculum was injected into the wall of the ascending colon, and the animals were examined after 1 yr. Changes were noted consistently only in those animals receiving the Crohn's disease inoculum. These changes consisted of thickened bowel wall with increased mucosal folds, thickened mesenteric fat with some creeping, irregular areas of thin colonic mucosa, and hyperplastic mesenteric lymph nodes. The terminal ileum distant from the inoculum site was smooth with atrophic changes only in the Crohn's inoculated group of animals. These animals also had discrete collections of macrophages in colon or sacculus, mucosal and submucosal edema, and chronic inflammation of the colon. However, the characteristic features of Crohn's disease were not reproduced.

0234 MALIGNANT DEGENERATION OF EXPERIMENTAL ULCERATIVE COLITIS OF THE RAT FOLLOWING SUBCUTANEOUS INJECTION OF 1,2-DIMETHYLHYDRAZINE. (Ger.) Dahm, K.; Knipper, A.; Mitschke, H. (Abteilung Allgemeinchirurgie der Chirurgischen Klinik, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Langenbecks Arch. Chir.* 343(4):307-311; 1977.

Experiments were carried out in male Wistar rats to determine whether the colon is more susceptible to malignant transformation in the presence of ulcerative colitis than when it is intact. Ulcerative colitis was induced by treating the rats with 4% carrageenan in the drinking water. The colon-specific carcinogen 1,2-dimethylhydrazine (DMH, 19.3 mg/kg) was then administered s.c. daily for 7 weeks. The animals received carrageenan up until 6 weeks after the last injection of DMH. Seventeen of the 18 rats with carrageenan-induced ulcerative colitis developed multiple adenocarcinomas of the distal colon by 15 weeks after the last DMH injection. In addition to adenocarcinomas, squamous cell metaplasias were also present. Only 3 of 18 controls treated with DMH alone developed adenocarcinomas of the distal colon, and none of 12 animals treated with carrageenan alone developed adenocarcinomas; 1 of the 12 animals did develop an adenoma with marked dysplasia. The results suggest that, during ulcerative colitis, the rat colon is more susceptible to tumor induction than it is when intact.

0235 DIFFERENCES IN SURVIVAL OF MOUSE COLON CRYPTS AFTER WHOLE- OR PARTIAL-BODY IRRADIATION. (Eng.) Hamilton, E. (Imperial Cancer Res. Fund Lab., Lincoln's Inn Fields, London WC2A 3PX, England). *Int. J. Radiat. Biol.* 31(4):341-347; 1977.

The survival of mouse colon crypts after whole- and partial-body x-irradiation was studied by the microcolony technique. The D_0 for crypt survival was 266 rad after whole-body irradiation in air, but when the colon alone was irradiated, the D_0 was 340 rad. In mice that were breathing 95% oxygen, the D_0 values were 238 rad for whole-body and 302 rad for colon irradiation. The survival curves were all extrapolated to the same number, and the threshold dose was also increased with colon irradiation. There was therefore an enhancement of colon crypt survival of about 27% by local as opposed to whole-body irradiation. These results might be explained by a circulating repair promoter or by the production of a toxin after whole-body irradiation.

0236 ISOLATION OF THE CECAL MICROFLORA OF MICE AND COMPARISON BETWEEN THE GASTRO-INTESTINAL AND THE FECAL MICROFLORAS. (Eng.) Koopman, J. P.; Janssen, F. G. J.; van Druten, J. A. M. (Central Animal Lab., Catholic Univ. Nijmegen, Geert Grooteplein Noord 29, Nijmegen, Netherlands). *Z. Versuchstierkd.* 19(1/2):62-70; 1977.

The number of bacteria that could be cultured from the cecum of SPF mice was determined, and the gastrointestinal and fecal microfloras were compared. The recovery of cecum bacteria was determined by three bacteriological techniques: an aerobic technique, an anaerobic jar technique, and a strict anaerobic glove-box technique. The median values for the yields were 0.46%, 4.8%, and 37%, resp. Lactobacilli, staphylococci, and streptococci were present in relatively low levels (median values/g, resp., 9.3 x 10^8, 1.6 x 10^6, and 2.4 x 10^5). Subsequently, the recovery of cecum bacteria from CRF-mice and GF-mice associated with 10 *in vitro* cultured anaerobic (bacterial) strains (ex-GF) was determined using a strict anaerobic technique. These yields were compared with the results obtained in SPF-mice. The cecal weights were different. However, the microscopic counts per cecum were not significantly different among the three groups, i.e., 1.6×10^{10} (median values). Accordingly, the concentration of cecal bacteria was not equal in the three groups. The viable count as percentage of the total numbers of bacteria in the ceca of ex-GF, CRF, and SPF-mice was 54%, 44%, and 37%, resp. Within the three bacteriologically different groups, evidence for a positive correlation between cecal weight and microscopic count per cecum, resp., viable count per cecum was found. The bacterial concentrations per gram contents in stomach/small intestine, cecum/large intestine and feces were 2.1×10^{8}, 1.7×10^{10}, and 1.9×10^{10}, resp. The excretion of bacteria with the feces per 24 hr varied between 54% and 400% (median value 150%) of the number of bacteria present in the gastrointestinal tract.

0237 THE INFLUENCE OF ADRENOCEPTOR ACTIVITY ON CELL PROLIFERATION IN COLONIC CRYPT EPITHELIUM AND IN COLONIC ADENOCARCINOMATA.

(Eng.) Tutton, P. J. M.; Barkla, D. H. (Dept. Anatomy, Monash Univ., Clayton, Victoria, 3168, Australia). *Virchows Arch.* [*Cell Pathol.*] 24(2):139-146; 1977.

The effects of chemical sympathectomy and of the injection of amines or amine receptor blocking drugs on cell proliferation in colonic crypts and in dimethylhydrazine-induced colonic carcinomas were examined in male Sprague-Dawley rats using a stathmokinetic technique. In animals chemically sympathectomized by the injection of 6-hydroxydopamine (100 mg/kg, i.v.), cell proliferation essentially ceased in the colonic crypts but continued at a normal rate in the tumors. Stimulation of α-adrenoceptors by metaraminol (2.5 mg/kg) caused acceleration of cell proliferation in colonic crypts but not in tumors. Conversely, blockade of α-adrenoceptors by phentolamine (10 mg/kg) inhibited cell proliferation in crypts but not in tumors. The injection of epinephrine (1 mg/kg) inhibited cell proliferation in the tumors but not in colonic crypts, whereas blockade of β-adrenoceptors by propranolol (20 mg/kg) accelerated cell proliferation in tumors but not in colonic crypts. It is postulated that cell proliferation in the crypts of Lieberkuhn in rat colon resembles that in rat jejunum in being controlled by the autonomic nervous system. However, tumor cell proliferation does not appear to be subject to such regulation.

0238 PATHOGENESIS OF SHIGELLA DIARRHEA. VII. EVIDENCE FOR A CELL MEMBRANE TOXIN RECEPTOR INVOLVING β1→4-LINKED n-ACETYL-D-GLUCOSAMINE OLIGOMERS.

(Eng.) Keusch, G. T.; Jacewicz, M. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *J. Exp. Med.* 146(2):535-546; 1977.

To determine whether mammalian cells possess a membrane receptor for *Shigella dysenteriae* 1 cytotoxin, the binding of this cytotoxin to HeLa cells in culture and to isolated rat liver cell membranes was studied by an indirect consumption assay of toxicity from the medium or by determination of cytotoxicity to the HeLa cell monolayer. Both liver cell membranes and HeLa cells removed toxicity from the medium during incubation, in contrast to WI-38 and Y-1 mouse adrenal tumor cells. Uptake of toxin was directly related to concentration of membranes added, time, and temperature, and indirectly related to the ionic strength of the buffer used. The chemical nature of the membrane receptor was characterized by using three principal approaches: (a) enzymatic sensitivity, (b) competitive inhibition, and (c) receptor blockade studies. The receptor was destroyed by proteolytic enzymes, phospholipases (which markedly altered the gross appearance of the membrane preparation), and by lysozyme, but not by a variety of other enzymes (galactose oxidase, β-galactosidase, neuraminidase). Of 28 carbohydrate and glycoprotein haptens studied, including cholera toxin and ganglioside, only the chitin oligosaccharide lysozyme substrates, per *N*-acetylated chitotriose, chitotetraose, and chitopentaose, were effective competitive inhibitors. Greatest inhibition was found with the trimer, *N*,*N*',*N*" triacetyl chitotriose. Of three lectins studied as possible receptor blockers, including phytohemagglutinin, concanavalin A, and wheat germ agglutinin, only the latter, which is known to possess specific binding affinity for *N*,*N*',*N*" triacetyl chitotriose, blocked toxin uptake. Evidence from all three approaches indicate that a glycoprotein toxin receptor exists on mammalian cells, with involvement of oligomeric β1→4-linked *N*-acetyl glucosamine in the receptor. This receptor is clearly distinct from the G_{M1} ganglioside thought to be involved in the binding of cholera toxin to the cell membrane of a variety of cell types susceptible to its action.

0239 HEPATIC BLOOD FLOW MEASUREMENT: A COMPARISON OF THE INDOCYANINE GREEN AND ELECTROMAGNETIC TECHNIQUES IN NORMAL AND ABNORMAL FLOW STATES IN THE DOG.

(Eng.) Teranaka, M.; Schenk, W. G. (Dept. Surgery, State Univ. New York at Buffalo, Buffalo, NY). *Ann. Surg.* 185(1):58-63; 1977.

Hepatic blood flow was measured simultaneously by the electromagnetic technique (EMF) and by clearance of a single injection of indocyanine green (ICG, 0.4-0.7 mg/kg body weight) in 9 normal dogs and 14 dogs in unsteady state following hemorrhage (the amount of acute blood loss ranged 0.5-1.0% of body weight) to establish the validity of the ICG method in both steady and unsteady states. Close correlation between the ICG clearance (25.3 ± 9.7 ml/kg body weight/min) technique and the EMF technique (26.3 ± 9.1 ml/kg body weight/min) under normal flow states was seen. However, under the unsteady condition (15 min bleeding), ICG indirect flow measurement (14.04 ± 4.8 ml/kg body weight/min) estimated only 71% of the actual instantaneous electromagnetic flow value of 19.0 ± 4.9 ml/kg body weight/min. It is suggested that while the EMF method continues to measure the actual total hepatic blood flow, the ICG method may measure the functional hepatic flow.

0240 EFFECTS OF BILE AND BILE ACIDS ON CULTURED HUMAN FIBROBLASTS. (Eng.) Trias, X.; Strebel, H. M.; Paumgartner, G.; Wiesmann, U. N. (Dept. Pediatrics, Univ. Bern, Freiburgstrasse 23, CH-3010 Berne, Switzerland). *Eur. J. Clin. Invest.* 7(3):189-194; 1977.

To determine whether impaired healing induced by leakage of bile is a factor responsible for complications after reconstructive bile duct surgery, the cytotoxicity of human bile, and its major bile acids, on cultured human fibroblasts was studied. The effects of bile and bile acids on cell morphology and growth, on synthesis and secretion of $^{35}SO_4$-mucopolysaccharides, and on release of a lysosomal enzyme were evaluated. Normal human fibroblasts derived from a standard culture strain (MRC-5) were grown to confluence and exposed to: (a) sterile human T-tube bile, (b) a mixture of bile acids resembling that of human bile, or (c) various concentrations of the glycine and taurine conjugates of cholic, chenodeoxycholic, or deoxycholic acid. Medium containing whole bile (total bile acid concentration 0.25, 0.75, or 1.6 mM) exerted time- and dose-dependent cytotoxic effects on morphology and growth and release of lysosomal enzyme. Synthesis and secretion of $^{35}SO_4$-mucopolysaccharides were markedly inhibited. The bile acid mixture exhibited the same time- and dose-dependent effects. The conjugates of deoxycholic acid were found to be the most toxic of the individual bile acids studied.

0241 THE ROLE OF TUBULAR REABSORPTION IN THE RENAL EXCRETION OF BILE ACIDS. (Eng.) Barnes, S.; Gollan, J. L.; Billing, B. H. (Univ. Alabama Medical Center, Birmingham, AL 35294). *Biochem. J.* 166(1):65-73; 1977.

To provide possible explanations for the bile acid composition in human cholestatic urine, the renal excretion of bile acids was studied in an isolated rat kidney preparation perfused with a protein-free medium. Tubular reabsorption exceeded 95% for both nonsulfated and sulfated bile acids at filtered loads of less than 30 nmol/min. At low filtered loads, the reabsorption of taurocholate and taurochenodeoxycholate was almost complete. Efficient reabsorption of taurochenodeoxycholate was maintained over a wider range of filtered loads than for taurocholate. These observations suggest that active transport may occur. At high filtered loads, saturation of reabsorption of taurocholate and taurochenodeoxycholate did not occur, which indicates that passive diffusion is involved in reabsorption. Active proximal-tubular secretion of bile acids was not demonstrated in competition experiments with *p*-aminohippurate. The fractional reabsorption of taurocholate, chenodeoxycholate, 3,7-disulfate, and chenodeoxycholate 7-monosulfate was decreased by the addition of taurochenodeoxycholate to the perfusate, so that their renal excretion was enhanced. This interaction between the bile acids for reabsorption may explain the different composition of bile acids in urine compared with that in plasma in cholestasis in man. Conjugated bilirubin decreased the fractional reabsorption of both taurocholate and taurochenodeoxycholate at low filtered loads (<30 nmol/min) but not at high filtered loads (400 nmol/min).

0242 ROLE OF INTRACELLULAR SPACE IN THE INTEGRATION OF NERVOUS AND HORMONAL REGULATION OF THE DIGESTIVE TRACT. (Rus.) Solov'eva, I. A. (No affiliation given). *Dokl. Akad. Nauk SSSR* 233(6):1208-1210; 1977.

0243 DUODENAL FISTULA: LONG-TERM OBSERVATIONS IN ANIMAL EXPERIMENTS. (Ger.) Helwing, E. (Medizinische Hochschule Hannover, Pasteurallee, D-3000 Hanover 51, W. Germany). *Z. Exp. Chir.* 10(2):79-83; 1977.

0244 STRUCTURAL AND FUNCTIONAL CHANGES IN THE SMALL INTESTINE IN PERITONITIS. (Rus.) Popov, V. A. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Patol. Fiziol. Eksp. Ter.* (1): 32-37; 1976.

0245 THE INTERACTION OF THE INTESTINAL EPITHELIUM WITH Vibrio cholerae AND Escherichia coli (HISTOLOGICAL AND ELECTRON MICROSCOPIC STUDY). (Rus.) Polotsky, Yu. E.; Dragunskaya, E. M.; Snigirevskaya, E. S.; Seliverstova, V. G. (Inst. Experimental Medicine, USSR Acad. Medical Sciences, Leningrad, USSR). *Arkh. Patol.* 39(2):10-17; 1977.

0246 MORPHOLOGICAL MANIFESTATIONS OF ABSORPTION OF Shigella sonnei ON THE INTESTINAL EPITHELIUM. (Rus.) Kovalchuk, V. K. (Kiev Scientific Res. Inst. Infectious Diseases, Kiev, USSR). *Arkh. Patol.* 39(4):68-73; 1977.

0247 ANASTOMOSIS DELAYING THE ALIMENTARY TRANSIT BY 180° AXIAL ROTATION OF THE UPPER INTESTINAL SEGMENT FOLLOWING MASSIVE RESECTION OF THE SMALL INTESTINE. PRELIMINARY REPORT ON EXPERIMENTS ON ADULT DOGS. (Fre.) Salomao, J.; Bosgiraud, F.; Vayre, P. (Hopital Vaugirard 389, rue de Vaugirard, 75 Paris, France). *J. Chir. (Paris)* 112(1/2):99-105; 1976.

0248 EXPERIMENTAL STUDY OF EVERTED INTESTINAL CLOSURES. COMMUNICATION I: ILEOILEAL ANASTOMOSIS. (Ita.) Dell'Anna, B.; Sacco, M.; Melissari, M. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica II^{a}, Universita degli Studi Di Parma, Parma, Italy). *Chir. Patol. Sper.* 24(4):289-306; 1976.

0249 EXPERIMENTAL STUDY OF EVERTED INTESTINAL CLOSURES. COMMUNICATION II: COLONIC COLOCOLIC ANASTOMOSIS. (Ita.) Dell'Anna, B.; Sacco, M.; Melissari, M. (Istituto di Clinica Generale e Terapia Chirurgica II^{a}, Universita degli Studi di Parma, Parma, Italy). *Chir. Patol. Sper.* 24(4):307-321; 1976.

0250 SPECIFIC INHIBITION OF MOUSE CELL PROLIFERATION BY AN AQUEOUS EXTRACT OF RABBIT COLON. (Fre.) Sassier, P.; Bergeron, M. (Dept. de physiologie, Universite de Montreal, Montreal, Quebec, Canada). *Clin. Res.* 24(5):666A; 1976.

0251 CHANGES IN THE GASTRIC MUCOSA IN DOGS FOLLOWING INTESTINAL RESECTION. (Spa.) Rodriguez Montes, J. A.; Spreafico, J. M.; Carmena, A.; Diaz Flores, L.; Arcelus, I. (Hospital Clinico "San Cecilio," Universidad de F Granada, Granada, Spain). *Rev. Esp. Enferm. Apar. Dig.* 48(6):673-682; 1976.

0252 QUANTITATIVE STUDY ON THE INFLUENCE OF DIFFERENT ALKALINE AGENTS ON THE EXPERIMENTAL ULCEROGENIC AND ANALGESIC ACTIVITY OF ASPIRIN. (Fre.) Hertz, F.; Lwoff, J. M.; Boissier, J. R. (Laboratoire de Pharmacologie II, UER Biomedicale des Cordeliers, 15, rue de l'Ecole-de-Medecine, F 75270 Paris Cedex 06, France). *Biol. Gastroenterol. (Paris)* 9(3):193-198; 1976.

0253 COMPARISON OF THE LEVEL OF THE INITIATED SERUM CHEMILUMINESCENCE AND THE BLOOD SERUM ENZYME ACTIVITIES IN DOGS WITH ACUTE HEPATIC INSUFFICIENCY. (Rus.) Evseev, N. G.; Farkhutdinov, R. R.; Mashkov, O. A.; Tishina, L. M. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Patol. Fiziol. Eksp. Ter.* (6):76-78; 1976.

0254 INTRACORPOREAL DIALYSIS IN HEPATIC INSUFFICIENCY. (Rus.) Ostroverkhov, G. E.; Berklavichus, V. Yu.; Bruslik, V. G. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Eksp. Khir. Anesteziol.* (4):41-45; 1976.

0255 SPECIFICITY OF β-GALACTOSIDASE IN HEPATOCELLULAR LESIONS. (Fre.) Smeesters, C.; Fourtanier, G.; Corman, J.; Daloze, P. (Dept. Chirurgie, Universite Montreal, Montreal, Canada). *Union Med. Can.* 105(10):1542-1544; 1976.

0256 INVAGINATION CHOLECYSTOSTOMY UNDER EXPERIMENTAL CONDITIONS. (Rus.) Margolis, G. A. (Izhevsk Medical Inst., Izhevsk, USSR). *Eksp. Khir. Anesteziol.* (4):64-65; 1976.

0257 ON THE SEQUELAE OF WEDGE-SHAPED RESECTION OF THE LIVER UNDER EXPERIMENTAL CONDITIONS. (Rus.) Toidze, Sh. S.; Izraelashvili, M. Sh. (Tbilisi Medical Inst., Tbilisi, USSR). *Eksp. Khir. Anesteziol.* (4):45-47; 1976.

0258 HOMOLOGOUS LIVER AND LIVER-KIDNEY TRANSPLANTATION. AN EXPERIMENTAL STUDY. (Ger.) Rigler, B. (Universitatsklinik fur Chirurgie Graz, Graz, Austria). *Z. Exp. Chir.* 9(5):262-281; 1976.

0259 REPAIR OF GASTRIC FUNDO-ANTRAL FISTULA BY HOMOLOGOUS AND HETEROLOGOUS FUNDO-ANTRAL TRANSPLANTATION IN THE ADULT RAT. (Fre.) Hung Le Van; Nin Khieu; Tuyet Nga Duong. (Laboratoire de Physiologie metabolique et Nutrition, Universite Pierre-et-Marie-Curie, 9, quai Saint-Bernard, 75005 Paris, France). *C. R. Acad. Sci. [D] (Paris)* 284(18):1823-1825; 1977.

0260 HEMIN COMPOUNDS OF BLOOD SERUM IN EXPERIMENTAL DESTRUCTIVE PANCREATITIS. (Rus.) Starosek, V. N.; Spitsyn, I. F. (Crimean Medical Inst., Simferopol, USSR). *Patol. Fiziol. Eksp. Ter.* (4):66-67; 1977.

0261 THE EFFICIENCY OF REVASCULARIZATION OF THE LIVER BY INTRAHEPATIC IMPLANTATION OF THE SPLENIC VASCULAR PEDICLE. (Fre.) Ionesco, G.; Neumann, E.; Lazar, A. (First Surgical Clinic, Str. Clinicilov 3, 3400 Cluj-Napoca, Rumania). *J. Chir. (Paris)* 112(3):199-208; 1976.

0262 ANTIBODIES TO A COUPLED MOLECULE OF SYNTHETIC GASTRIN IN THE BLOOD OF HEALTHY HUMANS. (Rus.) Polosatov, M. V. (Pavlov's Inst. Physiology, Acad. Science USSR, Leningrad, USSR). *Fiziol. Zh. SSSR* 63(5):750-752; 1977.

0263 CHANGES IN PLASMA MAGNESIUM LEVEL IN A GROUP OF ANIMALS FOLLOWING JEJUNO-ILEAL BYPASS. (Fre.) Annoni, F.; Longoni, F. (Istituto di Patologia Chirurgica III, Universita di Milano, Milano, Italy). *Ann. Biol. Anim. Biochem. Biophys.* 16(1):97-100; 1976.

0264 VARIATIONS IN THE PHAGOCYTOSIS CAPACITY OF KUPFER CELLS. (Rus.) Petrovitchev, N. N. (First Leningrad Medical Inst., Leningrad, USSR). *Tsitologiia* 18(12):1506-1507; 1976.

0265 TOTAL SYNTHESIS OF HUMAN BIG GASTRIN I AND THE 32-LEUCINE ANALOGUE: PRELIMINARY COMMUNICATION. (Ger.) Wunsch, E.; Wendlberger, G.; Hallett, A.; Jaeger, E.; Knof, S.; Moroder, L.; *et al.* (Max-Planck-Institut fur Biochemie, D-8033 Martinsreid bei Munchen, W. Germany). *Z. Naturforsch. [C]* 32(7/8):495-506; 1977.

0266 GENERAL ANESTHESIA IN THE RABBIT FOR SURGICAL RESEARCH ON THE DIGESTIVE TRACT.

(Fre.) Henry, X.; Verhaeghe, P.; Canarelli, J. P.; Stoppa, R. (Centre Hospitalier Regional et Universitaire, 1, place Victor-Pauchet, 80037 Amiens, France). *J. Chir. (Paris)* 113(4):437-440; 1977.

0267 ACUTE STRESS ULCER: EXPERIMENTAL STUDY ON ITS ETIOLOGY, PATHOPHYSIOLOGY, AND MANAGEMENT. (Jpn.) Yamaguchi, T. (Kyoto Univ. Sch. Medicine, Kyoto, Japan). *Arch. Jpn. Chir.* 46(3):278-308; 1977.

0268 CHANGES IN TISSUE ENERGY METABOLISM IN DEVELOPMENT OF EXPERIMENTAL ULCERS OF THE STOMACH. (Rus.) Anichkov, S. V.; Zavodskaya, I. S.; Moreva, E. V. (Inst. Experimental Medicine, Acad. Medical Science USSR, Leningrad, USSR). *Patol. Fiziol. Eksp. Ter.* (4):25-28; 1977.

0269 BODY ORIENTATION, FOOD DEPRIVATION AND POTENTIATION OF RESTRAINT-INDUCED GASTRIC LESIONS. (Eng.) Vincent, G.; Glavin, G.; Rutkowski, J.; Pare, W. (Veterans Admin. Hosp., Perry Point, MD 21902). *Gastroenterol. Clin. Biol.* 1(6/7):539-543; 1977.

0270 SERUM PROTEIN CHANGES IN EXPERIMENTAL INTESTINAL BYPASS. (Pol.) Pardela, M.; Rudnicki, M. (Acad. Medicine, Katowicach, Poland). *Pol. Przegl. Chir.* 49(6):593-597; 1977.

0271 EFFECT OF EXPERIMENTAL INTESTINAL BYPASS ON FUNCTIONAL AND SUBMICROSCOPIC CHANGES IN THE LIVER DEPENDING ON THE DURATION OF OBSERVATION. (Pol.) Pardela, M. (ul. PPr 6/4, 41-800 Zabrze, Poland). *Pol. Przegl. Chir.* 49(6):567-572; 1977.

0272 EFFECT OF ASPARTATE AND METHANDROSTENOLON IN LEAD-INDUCED LESIONS OF LIVER CELL ENZYMES. (Rum.) Barbarino, F.; Ghelberg, N. W.; Nagy, S. (Institutul de Igiena si Sanacate Publica, Cluj-Napoca, Rumania). *Rev. Ig.* [*Bacteriol.*] 26(2):129-136; 1977.

0273 FECAL FAT DETERMINATION IN HEALTHY CHILDREN. (Por.) Penna, F. J.; Roquete, M. L. V.; de Carvalho, A. S. T.; Mota, J. A. C.; Leao, E.; Ferreira, R. A.; *et al.* (Rua Silvestre Ferraz, 68--ap. 301, Sagrada Familia 30000, Belo Horizonte-MG, Brazil). *Arq. Gastroenterol.* 14(2):106-108; 1977.

0274 CHOICE OF THE OPTIMUM LEVEL OF RESECTION OF THE PANCREAS. (Rus.) Grigor'ev, V. A. (Kalinin Medical Inst., Kalinin, USSR). *Vestn. Khir.* 118(5):48-52; 1977.

0275 PARENTERAL FEEDING IN PATIENTS IN THE IMMEDIATE POSTOPERATIVE PERIOD AFTER OPERATIONS ON GASTROINTESTINAL TRACT. (Rus.) Lytkin, M. I.; Chaplygina, Z. A.; Shanin, S. S. (Inst. Advanced Training of Physicians, Leningrad, USSR). *Vestn. Khir.* 118(5):104-107; 1977.

0276 VIP IN HUMAN NEONATES AND INFANTS AS MEASURED BY RADIOIMMUNOASSAY AND RADIORECEPTOR ASSAY. (Fre.) Dupont, C.; Besson, J.; Laburthe, M.; Bataille, D.; Rosselin, G. (Hopital Saint-Antoine, 184, rue du Faubourg Saint-Antoine, F 75571 Paris Cedex 12, France). *Ann. Endocrinol. (Paris)* 38(2):151-152; 1977.

0277 MORPHOLOGICAL INVESTIGATIONS OF EXTRAHEPATIC DISORDERS AFTER PORTACAVAL END-TO-SIDE ANASTOMOSIS IN RATS. (Ger.) Rasenack, U.; Grun, H.; Liehr, H. (Medizinische Univ.-Klinik Wurzburg, Josef-Schneider-Str. 2, D-8700 Wurzburg, W. Germany). *Z. Gastroenterol.* 15(7):457-468; 1977.

0278 INTESTINAL ANASTOMOSIS BY MICROSURGICAL TECHNIQUE. (Ger.) Lamesch, A.; Dociu, N. (Kinderklinik St. Katharinen, Zurmaiener Strasse 9-11, 5500 Trier, W. Germany). *Z. Kinderchir.* 21(3):263-274; 1977.

0279 DISTURBANCES OF MICROCIRCULATION IN PERITONITIS AND ACUTE ILEUS IN THE ANGIOGRAPHIC PICTURE. (Ger.) Salkov, Ju. L.; Levendjuk, A. M. (Forschungsinstitut fur Allgemeine und Unfallchirurgie, Vjezd Balakireva 1, Charkow 18, USSR). *Radiol. Diagn. (Berl.)* 18(2):205-210; 1977.

0280 EFFECT OF THE PANCREATIC KALLIKREIN AND TRYPSIN INHIBITORS ON THE COURSE OF POSTISCHEMIC TOXEMIA. (Rus.) Kharchenko, V. Z.; Protsenko, V. A. (Kiev Inst. Pediatrics, Obstetrics, and Gynecology, Kiev, USSR). *Farmakol. Toksikol.* 40(5):606-613; 1977.

0281 VELOCITY OF INJECTION OF CONTRAST SUBSTANCE DURING AIMED ARTERIOGRAPHY IN ACUTE HEMORRHAGE INTO INTESTINAL TRACT. (Cze.) Vitek, J.; Potrusil, B.; Prochazka, J.; Kastak, B.; Krejcova, H. (Pekarska 53, 656 51 Brno, Czechoslovakia). *Cesk. Radiol.* 31(3):167-171; 1977.

0282 NEW KNOWLEDGE ON ARTERIAL BLOOD SUPPLY OF THE THIRD AND FOURTH PARTS OF THE DUODENUM: SURGICAL APPLICATIONS. (Fre.) Landier, J. F.; Calmat, A.; Honnart, F.; Clot, J. P.; Cabrol, C. (Pitie-Salpetriere, 105, boulevard de l'Hopital, 75013 Paris, France). *J. Chir. (Paris)* 113(4):405-411; 1977.

See also, 0010, 0020, 0098, 0223, 0718.

0283 ULTRASONIC DISTINCTION OF ABSCESSES FROM OTHER INTRA-ABDOMINAL FLUID COLLECTIONS. (Eng.) Doust, B. D.; Quiroz, F.; Stewart, J. M. (Medical Coll. Wisconsin, 8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Radiology* 125(1):213-218; 1977.

To investigate the ultrasonic distinction of abscesses from other intra-abdominal fluid collections, the nature of 103 intra-abdominal fluid collections examined by ultrasound was determined by autopsy, needle aspiration, spontaneous drainage, or surgical exploration. Abscesses, chronic hematomas, lymphoceles, urinomas, cysts, and fluid-filled bowel loops were all approximately elliptical or circular in cross section. Collections of ascites had a very irregular outline. Bowel loops appeared as multiple circles, all of similar size. Chronic hematomas contained strongly echoing material, while lymphoceles, urinomas, renal and hepatic cysts, and collections of ascites were echo-free. One ovarian cyst into which there had been bleeding contained echoes. The walls of abscesses, chronic hematomas, and bowel loops were less sharp than the walls of other collections. Intrahepatic abscesses had more ragged walls than abscesses elsewhere. Ultrasonic characteristics of abscesses and hematomas overlapped. It is sometimes possible to distinguish the nature of the fluid by its ultrasonic properties, but atypical appearances are not rare.

0284 HEPTADECAPEPTIDE GASTRIN: MEASUREMENT IN BLOOD BY SPECIFIC RADIOIMMUNOASSAY. (Eng.) Dockray, G. J.; Taylor, I. L. (Dept. Physiology, Univ. Liverpool, Brownlow Hill, P.O. Box 147, Liverpool L69 3BX, England). *Gastroenterology* 71(6):971-977; 1976.

The characteristics of an antibody (designated L6) that has absolute specificity for heptadecapeptide gastrin are described. This antibody was found to bind G17, but not peptide fragments or molecular forms of gastrin comprising G17 with either amino acid deletions, or additions, at the carboxyl- and amino-terminals. In sera from patients with Zollinger-Ellison syndrome, the only form of gastrin revealed by L6 was compatible with G17, and there was good agreement between estimated G17 concentrations in serum analyzed by gel filtration and by direct radioimmunoassay using L6. Using L6 in conjunction with antibodies specific for carboxyl- and amino-terminals of G17, it was possible to measure concentrations of different forms of gastrin in the sera of normal subjects after a meal in greater detail than was previously possible. After a light meal consisting of eggs, toast, and Oxo, serum concentrations of G17 measured by L6 increased to a peak 20 min after feeding (Δ gastrin, 19 pM; n=17). In contrast, the concentration of G34 peaked at 50 min (Δ gastrin, 27 pM). Small amounts of amino-terminal fragments of G17 were present throughout the digestive period. Applying the known ratio of biological potencies of G34 and G17 for stimulation of acid secretion in man, it is estimated that G17 accounts for about 75% of the biological activity in blood after a meal, even though G34 is present in higher molar concentrations.

0285 LYSOZYME LEVELS IN CHRONIC INFLAMMATORY BOWEL DISEASES. (Ger.) Rollinghoff, W.; Brandes, J. W.; Ehms, H.; Miller, B.; Schmulling, R. M.; Tischendorf, F. W.; Malchow, H. (Abt. Innere Medizin I, Otfried-Muller-Strasse, D-7400 Tubingen, W. Germany). *Klin. Wochenschr.* 55(5):225-230; 1977.

Urinary and serum lysozyme concentrations were determined by the lysoplate method of Osserman in 101 patients with Crohn's disease and 26 patients with ulcerative colitis and compared to 38 normal controls. Of the 101 patients with Crohn's disease, 29 showed changes of the small intestine, 31 had involvement of the small and large colon, and 16 showed involvement of the colon, 5 of the duodenum, and 1 of the stomach. At the time of the study, 14 patients were treated with prednisolone, 18 with salazopyrine, 23 with both the preceding agents, and 7 azathioprine; 28 had no therapy. Of the 26 patients with ulcerative colitis, the colon was extirpated in 3, 20 received salazopyrine, 1 received prednisolone, 4 received both of the latter 2 drugs, and 4 had no therapy. The mean serum lysozyme level of the patients with Crohn's disease was 8.2 ± 2.6 μg/ml as compared with 8.6 ± 2.9 μg/ml for the patients with ulcerative colitis and 8.4 ± 1.8 μg/ml for controls; no significant differences were noted between the patients and controls. Furthermore, no correlation between serum lysozyme levels and the disease activity index was found. However, serum lysozyme levels were significantly higher in patients with Crohn's disease of the small and large bowel (9.5 ± 3.5 μg/ml) than in patients with involvement of the small bowel only (8.1 ± 2.4 μg/ml) or operated patients (7.5 ± 1.5 μg/ml). The mean urinary lysozyme levels in 74 patients with Crohn's disease was 0.9 ± 2.1 μg/ml (normal value 0.9 ± 0.9 μg/ml) as compared with 0.1-16.6 μg/ml for 26 patients with ulcerative colitis. The results suggest that the determination of serum and urinary lysozyme levels is unsuitable for the differential diagnosis of inflammatory bowel disease and for assessment of disease activity.

0286 CHANGES IN THE ARCHITECTONICS OF AZYGOUS VISCERAL ARTERIES AFTER SURGICAL INTERVENTIONS ON ABDOMINAL ORGANS. (Rus.) Prokubovsky, V. I.; Efleev, V. P.; Frantsev, Ju. V. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vestn. Khir.* 118(2):51-56; 1977.

0287 RETROGRADE CATHETERIZATION OF THE UMBILICAL VEIN: MANOMETRIC AND RADIOLOGIC DATA. (Spa.) Soria, T.; Parrilla, P.; Benages, A.; Almenar, L.; Mora, F.; Molina, R.; *et al.* (Hospital Clinico Universitario, Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 48(3):301-318; 1976.

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SIDEREMIA. (Ita.) Di Lollo, F.; Morini, P. L.; Fazzini, G.; Niosi, L. (S. Maria Nuova Hosp., Florence, Italy). *Minerva Med.* 68(9):559-567; 1977.

0289 METHODS FOR EVALUATING THE ABSORPTION OF CALCIUM IN THE HUMAN DIGESTIVE TRACT. (Ita.) Gennari, C. (Cattedra di Medicina Nucleare, Universita degli Studi, Siena, Italy). *Minerva Med.* 68(15):943-950; 1977.

0290 STABLE ISOTOPES IN GASTROENTEROLOGY. (Rus.) Belousov, A. S.; Bredikhina, N. A.; Zhuravlev, L. T. (Central Inst. Advanced Medical Studies, Moscow, USSR). *Sov. Med.* (2):13-16; 1977.

0291 CURRENT STATUS OF PROXIMAL DIGESTIVE ENDOSCOPY. (Fre.) Savary, M. (Centre Hospitalier Universitaire Vaudois, 1000 Lausanne, Switzerland). *Rev. Fr. Gastroenterol.* 127(7F):51-56; 1977.

0292 CUMULATION OF ENDOSCOPIC FINDINGS. (Ger.) v. Gaisberg, U.; Heinkel, K.; Kimmig, J. M. (Med. Klinik Stuttgart-Bad Cannstadt, Priessnitzweg 24, D-7000 Stuttgart 50, W. Germany). *Z. Gastroenterol.* 14(7):706-708; 1976.

0293 ROENTGENOLOGICAL PRACTICE. (Fre.) Faure, C.; Montagne, J. Ph. (Hopital Trousseau, 8-28, avenue Arnold-Netter, 75571 Paris Cedex 12, France). *Arch. Fr. Pediatr.* 34(2):193-194; 1977.

0294 RADIOLOGICAL DIAGNOSIS OF CHANGES IN THE UPPER DIGESTIVE TRACT. STRATEGY AND TECHNIQUE. (Ger.) Ordnung, W. (Heinz-Kalk-Klinik, Am Gradierbau, D-8730 Bad Kissingen, W. Germany). *Med. Klin.* 72(12):524-529; 1977.

0295 PANENDOSCOPY: INDICATION VS. FINDINGS. (Ger.) Jenny, S.; Kobler, E.; Nuesch, H. J.; Deyhle, P. (Medizinische Universitatspoliklinik, Departement fur Innere Medizin, Ramistrasse 100, Ch-8091 Zurich, Switzerland). *Z. Gastroenterol.* 14(7):708-709; 1976.

0296 MEASUREMENT OF OCCULT GASTROINTESTINAL HEMORRHAGE BY ^{51}Cr TEST DURING LONG-TERM ANTI-INFLAMMATORY TREATMENT. (Fre.) Tamisier, J. N.; Serot, J. M.; Netter, P.; Robert, J.; Pourel, J.; Gaucher, A. (Clinique Rhumatologique, Nancy, France). *Rev. Fr. Gastroenterol.* (122):37-45; 1976.

0297 IS IT POSSIBLE TO IMPROVE THE PROGNOSIS OF UPPER DIGESTIVE TRACT HEMORRHAGES (OTHER THAN PORTAL HYPERTENSION)? (Fre.) Pascal, J. P.; Tournut, R. (Service de Gastro-Enterologie, C.H.U. Toulouse-Purpan, F 31052 Toulouse Cedex, France). *Gastroenterol. Clin. Biol.* 1(5):409-414; 1977.

0298 INTERPRETATION OF THE RADIOLOGICAL PICTURE OF THE UPPER SEGMENT OF THE SMALL INTESTINE IN CHILDREN. (Fre.) Montagne, J. Ph.; Faure, Cl. (Hopital Trousseau, 8-28, avenue Arnold Netter, 75571 Paris Cedex 12, France). *Arch. Fr. Pediatr.* 34(1):90-104; 1977.

0299 A MODIFIED GUAIAC TEST FOR THE EARLY DETECTION OF TUMORS OF THE INTESTINAL TRACT. (Ger.) Warm, K.; Blazek, Z.; Weithofer, G.; Bloch, R. (Klinik fur Verdauungs- und Stoffwechselkrankheiten, Am Weinberg 3-5, D-6430 Bad Hersfeld, W. Germany). *Munch. Med. Wochenschr.* 119(9):285-288; 1977.

0300 ERRORS IN THE DIAGNOSIS OF INTESTINAL LIPOMA. (Rus.) Makhov, N. I. (Moscow Medical Inst. Stomatology, Moscow, USSR). *Khirurgiia (Mosk.)* (2):114-117; 1977.

0301 (D+) XYLOSE TEST. (Rus.) Alimova, M. M. (Inst. Pediatrics, Acad. Medical Sciences, Moscow, USSR). *Pediatriia* (7):82-85; 1976.

0302 MALABSORPTION OF BILE ACIDS IN CHILDREN WHO DID NOT UNDERGO INTESTINAL RESECTION. (Fre.) Weber, A.; Roy, Cl. C.; Chartrand, L.; Morin, Cl. L.; Van Caillie, M. (Conseil de la Recherche Medicale du Quebec, Canada). *Rev. Fr. Gastroenterol.* (122):25-31; 1976.

0303 SIMPLIFIED HYPOTONIC DUODENOGRAPHY AND IMPROVED DOUBLE-CONTRAST VISUALIZATION OF THE STOMACH. (Ger.) Gerstner, H. D. (Radiologische Klinik, Stadt. Krankenanstalten, 6600 Saarbrucken 6, Winterberg, W. Germany). *Med. Welt* 27(44):2106-2109; 1976.

0304 EVALUATION OF COLONIC PATHOLOGIES: COLONOSCOPY AND RADIOLOGY. (Fre.) Archambault, A.; Bourgie, J.; Lamoureux, C. (Hopital Maisonneuve-Rosemont, Montreal, Canada). *Union Med. Can.* 106(6):853-861; 1977.

0305 COMPARATIVE PHARMACODYNAMIC COLON DOUBLE CONTRAST EXAMINATION WITH GLUCAGON AND ATROPINE. (Ger.) Poser, H.; Baier, J. (Chirurgischen Universitatsklinik, Hospitalstrasse 40, D-2300 Kiel, W. Germany). *Radiol. Diagn.* 18(3):355-358; 1977.

0306 INDIRECT SIGNS OF GASTRIC AND DUODENAL DISEASES AS EVIDENCED BY FIBROGASTROSCOPY.

(Rus.) Chekanov, B. Ya.; Kats, V. N. (Saratov Medical Inst., Saratov, USSR). *Vestn. Khir.* 118(4): 39-43; 1977.

0307 RADIOGRAPHIC INVESTIGATION OF THE STOMACH WITH DOUBLE CONTRAST. (Dan.) Thogersen, G. (Slotsparken 24, DK-2880 Bagsvaerd, Denmark). *Ugeskr. Laeger* 138(41):2492-2493; 1976.

0308 OPTIMAL SIMULTANEOUS EXAMINATION OF THE MAIN GASTRIC FUNCTIONS. (Rus.) Lukash, N. V.; Skripka, V. I. (Krymsk Medical Inst., Krymsk, USSR). *Vrach. Delo* (2):98-100; 1977.

See also, 0016, 0064, 0066, 0093, 0099, 0239, 0273, 0279, 0386, 0310, 0315, 0327, 0328, 0332, 0340, 0344, 0361, 0362, 0389, 0399, 0436, 0447, 0448, 0449, 0457, 0467, 0485, 0490, 0498, 0504, 0506, 0514, 0515, 0516, 0517, 0519, 0529, 0534, 0542, 0560, 0562, 0568, 0576, 0599, 0616, 0624, 0628, 0635, 0662, 0663, 0674, 0688, 0689, 0698, 0699, 0702, 0707, 0708, 0709, 0741, 0746, 0749.

GASTROINTESTINAL DISEASES

ESOPHAGUS

0309 RESPONSE OF LOWER ESOPHAGEAL SPHINCTER PRESSURE TO BEEF SOUP OR AOC-TETRAPEPTIDE STIMULATION IN ESOPHAGITIS. (Eng.) Nagasaki, A.; Ishimori, A.; Masamune, O.; Yamagata, S. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 121(1):91-97; 1977.

Lower esophageal sphincter (LES) pressure in the resting state and after stimulation with beef soup or anodal opening contraction (AOC) tetrapeptide were measured in healthy subjects and diseased patients by an infused open-tip method. The mean basal LES pressures in healthy subjects and in patients with gastric ulcer, duodenal ulcer, scleroderma without gastrointestinal symptoms, and esophageal hiatal hernia without esophagitis were 13.1 ± 1.7, 12.8 ± 1.4, 13.7 ± 1.4, 12.0, and 12.8 ± 1.4 cm water, resp. (differences not significant). In two cases of Zollinger-Ellison syndrome, the resting LES pressure was 24.1 ± 0.5 cm, which was significantly ($p<0.001$) higher than that in controls. In cases of esophagitis with hiatal hernia, esophagitis without hiatal hernia, and esophagitis following Billroth II gastrectomy, the LES pressure levels were 10.2 ± 1.2 ($0.001<p<0.01$), 10.1 ± 0.9 ($0.001<p<0.01$), and 6.9 ± 1.2 cm ($p<0.001$), resp., significantly lower than in controls. In cases of esophagitis, the resting LES pressure and corresponding fasting plasma gastrin level tended to be lower than those in healthy subjects, but the reverse was true in cases of Zollinger-Ellison syndrome. When 200 ml beef soup was infused into the stomach, the peak LES pressures of healthy subjects and patients with esophagitis were 25.7 ± 0.5 and 17.1 ± 1.8 cm, resp. The peak percentage response to the resting LES pressure in these two groups was 221.0 ± 4.2 and 180.5 ± 10.5, resp. This implies that the peak LES pressure and the peak percentage response in the LES pressure were lower in esophagitis patients than in healthy subjects. After the i.v. administration of 0.3 or 0.5 μg/kg of tetrapeptide, these parameters were again lower in esophagitis patients than in controls. It is concluded that there are some factors other than gastrin that make the LES pressure lower in esophagitis patients than in controls.

0310 GASTRO-OESOPHAGEAL SPHINCTER PRESSURE, MOTILITY AND ACID CLEARING. A STUDY OF HIATUS HERNIA PATIENTS AND NORMAL SUBJECTS, AND OF THE EFFECT OF A MODIFIED BELSEY MK IV REPAIR ON THE RESULTS OF THE MANOMETRIC AND ACID-CLEARING TESTS. (Eng.) Boesby, S. (Odense Sygehus, DK-Odense, Denmark). *Scand. J. Gastroenterol.* 12(4): 407-416; 1977.

The results of manometric and acid-clearing studies of patients with hiatal hernia were compared with those of normal subjects, and the effect of a modified Belsey MK IV repair for hiatal hernia on the results of the manometric and acid-clearing studies was evaluated. Basal gastroesophageal sphincter pressure was recorded in 68 patients with symptomatic, radiologically verified sliding hiatal hernia, and in 37 healthy subjects. The diameter of the probe was 2.5 mm, and the flow rate 0.5 ml/min. Mean sphincter pressure was lower in patients (6 mm Hg) than in normal subjects (15 mm Hg). In 32% of the patients, the sphincter pressure was within normal range (8-24 mm Hg), whereas in 68% it was lower than in the normal subjects. There seemed to be no relationship between sphincter pressure and severity of symptoms. Esophageal acid clearing was investigated in 57 of the patients and in 26 of the normal subjects. Normal subjects cleared the bolus of acid in an average of 10 swallows (range 4-16). In patients, the incidence of prolonged clearing was greater, but the acid-clearing ability did not seem to be related to the degree of severity of the symptoms. A manometric study was carried out in 45 patients and an acid-clearing study was carried out in 40 patients, before and 3 months after a modified Belsey MK IV repair. The mean postoperative sphincter pressure was higher (10 mm Hg) than the preoperative mean (6 mm Hg), but was still lower than the normal mean. Significant changes in acid-clearing ability were not demonstrated. The results are inconclusive with regard to the importance of esophageal motility disturbances for the symptomatology and acid-clearing ability. Thirty-seven of 45 patients became asymptomatic, and all but one of the remaining patients improved.

0311 FUNDOPLICATION FOR THE TREATMENT OF GASTROESOPHAGEAL REFLUX IN HIATAL HERNIA. (Eng.) Rossetti, M.; Hell, K. (Kantonsspital, CH-4410 Liestal, Switzerland). *World J. Surg.* 1(4):439-444; 1977.

Experience with 1,400 patients who underwent fundoplication for the treatment of reflux in hiatal hernia was reviewed to determine the correct indications for surgery. These indications include (a) a retrosternal burning sensation (in 90% of cases), (b) objective confirmation of reflux by means of x-ray and endoscopic examination, together with biopsy examination of the esophageal mucosa and gastric acid evaluation, and (c) evidence of organic complications, such as endobrachyesophagus with ulcerostenotic changes at the junction between the esophageal and gastric mucosa. Long-term follow-up of 590 patients with simple reflux esophagitis who underwent fundoplication showed that 87.5% were symptom free. In 44 patients with complicated gastroesophageal reflux disease, fundoplication produced clinical healing in 84.1%.

0312 CONSIDERATIONS ON A CASE OF CORK-SCREW ESOPHAGUS. (Ita.) Valentino, M. L.; Sansone, D. (Ospedale Riuniti di Napoli, Naples, Italy). *Rass. Int. Clin. Ter.* 57(9):626-631; 1977.

0313 A CASE REPORT OF AN ESOPHAGEAL FIBROLIPOMA. (Ger.) Merck, W.; Weerda, H. (Universitats-HNO-Klinik, Killianstr. 5, D-7800 Freiburg/Br., W. Germany). *HNO* 25(6):204-205; 1977.

0314 ESOPHAGEAL CANCER MORBIDITY AS EVIDENCED BY THE GENEALOGY OF PATIENTS REGISTERED IN THE GUR'EV PROVINCE. (Rus.) Nasipov, S. N. (Gur'ev Regional Oncology Clinic, USSR). *Vopr. Onkol.* 23(8):81-85; 1977.

0315 OESOPHAGOSCOPY. (Eng.) Bennett, J. R. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 83-97; 1976.

0316 HAEMATEMESIS AND MELAENA. (Eng.) Chandler, G. N.; Walls, W. D.; Glanville, J. N. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 109-116; 1976.

0317 MOTOR DISORDERS OF THE ESOPHAGUS. (Eng.) Henderson, R. D. (Baltimore: Williams & Wilkins): 231 pp.; 1976.

0318 FEEDING OF PATIENTS WITH ESOPHAGEAL INJURY. (Rus.) Abakumov, M. M.; Burdyga, F. A. (N. V. Sklifosovsky Scientific Res. Inst. First Aid, Moscow, USSR). *Vestn. Khir.* 118(5):24-27; 1977.

0319 REFLUX ESOPHAGITIS AND STRICTURE OF THE ANASTOMOSIS AFTER GASTRECTOMY. (Rus.) Britvin, A. A. (Vologodsy Regional Oncology Clinic, USSR). *Khirurgiia (Mosk.)* (8):21-24; 1977.

0320 PREVENTION OF ESOPHAGEAL INJURIES DURING BOUGINAGE. (Rus.) Kanshin, N. N.; Abakumov, M. M.; Sapozhnikova, M. A. (N. V. Sklifosovsky Scientific Res. Inst. First Aid, Moscow, USSR). *Khirurgiia (Mosk.)* (6):8-12; 1977.

0321 RESULTS OF THE SURGICAL TREATMENT OF HIATAL HERNIA IN THE ADULT USING A MODIFIED ALLISON TECHNIQUE: REPORT OF 82 CASES. (Fre.) Skalkeas, G. D. (St. Paul Univ. Hosp., Athens, Greece). *Chirurgie* 103(6):419-423; 1977.

0322 THERAPY OF ESOPHAGEAL REFLUX. (Ger.) Ottenjann, R. (Stadt. Krankenhaus Munchen-Neuperlach, Oskar Maria Graf-Ring 51, 8 Munchen 83, W. Germany). *Fortschr. Med.* 95(34):2098-2101; 1977.

0323 ESOPHAGO-AORTAL FISTULA AS A COMPLICATION OF TRACTION DIVERTICULUM. (Ger.) Margreiter, R.; Suckert, K. (Chirurgische Univ.-Klinik, Anichstrasse 35, A-6020 Innsbruck, Austria). *Chirurg* 48(5):331-333; 1977.

0324 FAILURES AND SUGGESTED FAILURES OF HELLER'S OPERATION FOR IDIOPATHIC MEGA-ESOPHAGUS: STUDY OF 55 REOPERATED CASES. (Fre.) Fekete, F.; Lortat-Jacob, J. L. (Hopital Beaujon, 100, boulevard du General Leclerc, 92110 Clichy, France). *Ann. Chir.* 31(6):515-524; 1977.

0325 LONG-TERM PROSPECTIVE FOLLOW-UP OF CHILDREN WITH A HIATAL HERNIA (PARTIAL THORACIC STOMACH) [Abstract]. (Eng.) Carre, I. J.; Astley, R.; Langmead-Smith, R. (Dept. Child Health, Queen's Univ. Belfast, Belfast, Northern Ireland). *Gut* 18(11):A990; 1977.

0326 THE TRANSJUGULAR TECHNIQUE FOR HEPATIC VENOGRAPHY AND BIOPSY CHOLANGIOGRAPHY AND OBLITERATION OF ESOPHAGEAL VARICES [Abstract]. (Eng.) Goldman, M. L.; Gonzalez, A. C.; Galambos, J. T.; Gordon, I.; Kibble, M. (Emory Univ. Affiliated Hosp., Atlanta, GA). *Gastroenterology* 73(5):1222; 1977.

0327 ENDOSCOPIC DIAGNOSIS AND THERAPY OF GASTROINTESTINAL HEMORRHAGE [Abstract]. (Eng.) Kiefhaber, P.; Nath, G.; Moritz, K.; Gorisch, W.; Kreitmair, A. (II. Med. Klinik, Ziemssenstr. 1, 8000 Munchen, W. Germany). *Endoscopy* 9(3):184-185; 1977.

0328 THE IMPORTANCE OF ENDOSCOPY IN REFLUX ESOPHAGITIS [Abstract]. (Eng.) Siewert, R. (Surgical Clinic, Univ. Gottingen, Gottingen, W. Germany). *Endoscopy* 9(3):185-186; 1977.

0329 REFLUX ESOPHAGITIS [Abstract]. (Eng.) Ottenjann, R. (Stadt. Krankenhauses Munchen-Neuperlach, Munchen, W. Germany). *Endoscopy* 9(3):185; 1977.

0330 RECURRENT BRONCHOPNEUMOPATHY DUE TO GASTRO-ESOPHAGEAL REFLUX: AN UNRECOGNIZED ENTITY. (Fre.) Dutau, G.; Terral Mias, A.; Ribot, C. (C.H.U. Rangueil, Toulouse, France). *Rev. Med. Toulouse* 12 (4):345-360; 1976.

0331 EFFECT OF NISSEN FUNDOPLICATION IN PATIENTS WITH GASTROESOPHAGEAL REFLUX [Abstract]. (Eng.) Bjerkeset, T.; Nordgard, K.; Schjonsby, H. (Haukeland Hosp., Bergen, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):9; 1977.

0332 DIAGNOSIS AND SURGICAL MANAGEMENT OF BENIGN DISEASES OF THE ESOPHAGUS. (Eng.) Nemir, P., Jr.; Wallace, H. W.; Fallahnejad, M.

(Faculty Medicine, Univ. Pennsylvania, Philadelphia, PA). *Curr. Probl. Surg.* 13(3):1-74; 1976.

0333 ESOPHAGEAL ATRESIA AND ASSOCIATED ANOMALIES. (Eng.) German, J. C.; Mahour, G. H.; Woolley, M. M. (Children's Hosp., Los Angeles, CA). *J. Pediatr. Surg.* 11(3):299-306; 1976.

0334 ESOPHAGEAL CARCINOMA WITH PSEUDOHYPERPARATHYROIDISM AND HYPERCORTICISM. (Eng.) Kumar, G. K.; Naidu, V. G.; Razzaque, M. A. (Wayne State Univ. Sch. Medicine, Detroit, MI). *Am. J. Gastroenterol.* 65(3):222-225; 1976.

See also, 0292, 0295, 0297, 0353, 0361, 0443, 0660, 0673.

STOMACH

0335 IMMUNOHISTOCHEMICAL INVESTIGATION OF GASTRIN-PRODUCING CELLS (G CELLS): THE DISTRIBUTION OF G CELLS IN RESECTED HUMAN STOMACHS. (Eng.) Stave, R.; Brandtzaeg, P. (Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 11(7):705-712; 1976.

Direct immunofluorescence with rhodamine-labeled rabbit antigastrin IgG conjugate was used to systematically map the G-cell distribution in resected stomachs from eight gastric ulcer patients and eight duodenal ulcer patients with uremia. G cells were not found in the body of the stomachs. A low number of G cells, which amounted to about 10 G cells per mucosal unit (MU, 6 µm thick and 1 mm wide block of tissue from the muscularis mucosae to the surface epithelium) occurred in a transitional zone at the proximal border of the antrum in both gastric ulcer and duodenal ulcer patients. No significant difference was found between the number of G cells per mucosal unit at various levels of the antrum in gastric ulcer patients; G cells/mucosal unit ranged from about 40-50 in these cases. In duodenal ulcer patients with uremia, there was a significant increase in the G cell number from the proximal (about 40 cells/MU) to the middle antrum (about 55 cells/MU, $0.02<p<0.05$) and especially from the proximal to the distal antrum (about 80 cells/MU) ($p<0.01$). There was no significant difference in the circumferential distribution of antral G cells between the two groups of patients. Statistically significant differences ($0.02<p<0.05$) between the two patient groups appeared for G cell counts in the distal third part of the antrum, with the number of G cells/MU being about 50 for gastric ulcer patients and about 80 for duodenal ulcer patients. The proximal end of the duodenum contained considerably fewer G cells (about 10 cells/MU in both patient groups) than the antrum. The results confirm the reported preponderance of G cells in the middle and basal third of the antral mucosa, although no conclusions are made concerning the difference in antral G cell distribution in the two patient groups.

0336 MENETRIER'S DISEASE: EFFECT OF MEDICAL AND SURGICAL VAGOTOMY. (Eng.) Russell, I. J.; Smith, J.; Dozois, R. R.; Wahner, H. W.; Bartholomew, L. G. (Mayo Graduate Sch. Medicine, Univ. Minnesota, Rochester, MN). *Mayo Clin. Proc.* 52(2):91-96; 1977.

The case of a 62-yr-old woman with incapacitating atherosclerotic vascular occlusive disease who was found to have severe hypoproteinemia as a result of Menetrier's disease is described. That diagnosis was suspected on roentgenographic and gastroscopic examinations and confirmed by examination of full-thickness surgical gastric biopsy specimens. The protein loss from the stomach was significantly decreased by treatment with trimethaphan (0.3-0.5 mg/min, 4.5 hr, i.v.) and atropine (0.5 mg every 2 hr, i.m.), and a proximal gastric vagotomy was carried out at the time of endarterectomy. Subsequent protein turnover studies suggested that there was a significant decrease in protein loss by the stomach; plasma radioactive albumin clearance was 90 ml/day immediately after surgery and 77 and 33 ml/day at 4 and 12 months postoperatively, resp., and gastric clearance was 41 ml/24 hr at 12 months after surgery. Further evaluation of the possible role of medical and surgical vagotomy in this disease seems warranted.

0337 GASTRIC MUCOSAL POLYPS IN PERNICIOUS ANAEMIA. (Eng.) Elsborg, L.; Andersen, D.; Myhre-Jensen, O.; Bastrup-Madsen, P. (Aarhus Amtssygehus, DK-8000 Aarhus C, Denmark). *Scand. J. Gastroenterol.* 12(1):49-52; 1977.

Sixty-eight patients with pernicious anemia were followed up for 4 yr to determine whether gastric mucosal polyps were present. Gastric polyps were observed in 25 patients. In nine patients the polyps completely vanished in a year or two. The number of polyps decreased during the observation period in two patients. New polyps developed in five patients in whom gastroscopy had showed none. None of these polyps underwent malignant transformation during the period of observation, and by histological examination they were classified as non-neoplastic "regenerative" benign polyps in an atrophic gastric mucosa. The surgical attitude to these non-neoplastic gastric polyps in pernicious anemia should be restrictive.

0338 ENDOSCOPIC FINDINGS OF BENIGN AND MALIGNANT SMOOTH MUSCLE TUMOURS OF THE STOMACH AND DUODENUM [Abstract]. (Eng.) Hradsky, M.; Furugard, K.; Gad, A.; Willen, R. (Falun Hosp., Falun, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):36; 1977.

0339 VARIABILITY OF GASTRITIS AND ATROPHY IN INDIVIDUAL HUMAN STOMACHS [Abstract]. (Eng.) Elgjo, K.; Stave, R.; Brandtzaeg, P.; Nygaard, K. (Natl. Hosp. Norway, Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):18; 1977.

0340 DIAGNOSIS OF ADENOCARCINOMA OF THE STOMACH: A CORRELATION BETWEEN BRUSH CYTOLOGY AND ENDOSCOPIC BIOPSY WITH REFERENCE TO GASTROSCOPIC AND ROENTGENOLOGIC INVESTIGATIONS [Abstract]. (Eng.) Willen, R.; Gad, A.; Willen, H.; Hradsky, M.; Furugard, K. (Falun Hosp., Falun, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):114; 1977.

0341 A CONTROLLED TRIAL OF CIMETIDINE IN GASTRIC ULCER DISEASE [Abstract]. (Eng.) Rahbek, I.; Frost, F.; Rune, S.; Birger Jensen, K.; Gudmand-Hoyer, E.; Krag, E.; *et al.* (Glostrup Univ. Hosp., Glostrup, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):75; 1977.

0342 USE OF CONCENTRATED SOLUTION OF DRY HYDROLYSINE FOR THE TREATMENT OF AGASTRIC ASTHENIA. (Rus.) Khlebnikova, I. M.; Senchilo, E. A. (Leningrad Scientific Res. Inst. Hematology and Blood Transfusion, Leningrad, USSR). *Vestn. Khir.* 119(8):55-58; 1977.

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0356 TOTAL GASTRECTOMY IN CARCINOMA OF THE STOMACH. A STATISTICAL STUDY OF 300 CASES. (Fre.) Guivarch, M.; Mouchet, A.; Marquand, J.; Portier, F. (Cent. Med. Chir. Foch, Suresnes, France). *Ann. Chir.* 30(5):385-390; 1976.

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0362 GASTRIC JUICE PROTEINS IN PATIENTS WITH CARCINOMA OF THE STOMACH [Abstract]. (Eng.) Stoichev, St.; Pandov, H.; Mircheva, Z. *In: Fourth Meeting of the European Association for Cancer Research held in Lyon, France, September 13-15, 1977.* p. 38; 1977.

See also, 0085, 0100, 0101, 0104, 0231, 0267, 0268, 0269, 0284, 0292, 0297, 0303, 0306, 0307, 0310, 0311, 0316, 0319, 0322, 0325, 0327, 0330, 0331, 0367, 0369, 0370, 0371, 0373, 0374, 0380, 0385, 0387, 0414, 0510, 0696, 0709, 0724, 0737.

STOMACH

Peptic Ulcers

0363 BASAL GASTRIC SECRETION: REPRODUCIBILITY AND RELATIONSHIP WITH DUODENAL ULCERATION. (Eng.) Faber, R. G.; Hobsley, M. (Middlesex Hosp. Medical Sch., London, England). *Gut* 18(1):57-63; 1977.

Basal gastric secretion was examined in control subjects (C), duodenal ulcer patients (DU), and DU patients after vagotomy (DU + V, with or without a drainage procedure). Secretion in terms of observed gastric juice volume (Vo) and of gastric juice volume corrected for pyloric losses and duodenal reflux (Vg) was significantly ($p<0.01$) less in the second than in the first half-hour of a 1-hr basal collection; C, DU, and DU + V groups showed Vo values of 4.387, 2.739, and 4.914 ml/hr, resp., and Vg values of 7.537, 7.242, and 4.353 ml/hr, resp. Basal acid output (BAO) was significantly ($p<0.05$) less also in the second half-hour of a 1-hr basal collection in controls and DU + V patients; the BAO values for C, DU, and DU + V groups were 2.102, 1.639, and 2.863, mM/hr, resp. The reproducibility of the second half-hour basal collections taken on two different occasions from DU and DU + V patients was poor; the 95% tolerance limits of the difference between the two tests in terms of Vo, titratable acidity (H^+), BAO, and VG were approximately 101.2 ml/hr, 42.2 mM, 9.28 mM/hr, and 107.6 ml/hr, resp., for DU patients and 106.0 ml/hr, 46.0 mM, 7.28 mM/hr, and 93.8 ml/hr, resp., for DU + V patients. When expressed in terms of basal secretion in excess of the upper 95% tolerance limits of C subjects, the percentages of DU patients exceeding these limits were 17 for Vo, 0 for H^+, 29 for BAO, and 19 for Vg. The percentages of DU + V patients with recurrent ulcer after vagotomy exceeding the 95% tolerance limits of DU + V patients without symptoms were 25 for Vo, 0 for H^+, 50 for BAO, and 25 for Vg. By all indices of secretion, basal gastric secretion in DU patients was significantly ($p<0.005$) greater than in C subjects or in asymptomatic DU + V patients. Secretion by all indices was also significantly ($p<0.05$) greater in recurrent ulcer DU + V patients than in asymptomatic DU + V patients. When changes in basal secretion were examined before and after vagotomy, only in terms of Vg was there a significant ($p<0.01$) difference between the two groups. The overlap in the results from different groups of patients was so great in general that basal secretion could not be ascribed an etiological role in the majority of patients with duodenal ulcer.

0364 THE ROLE OF THE BETA-ADRENERGIC RECEPTOR IN THE SECRETION OF GASTRIN: STUDIES IN NORMAL SUBJECTS AND IN PATIENTS WITH DUODENAL ULCERS. (Eng.) Brandsborg, O.; Brandsborg, M.; Christensen, N. J. (Kommunehospitalet, Aarhus C, Denmark). *Eur. J. Clin. Invest.* 6(5):395-401; 1976.

The role of beta-adrenergic receptors in gastrin secretion was studied in 8 normal men and 11 patients with duodenal ulcer. The i.v. infusion of isoproterenol (2 µg/min, 20 min) increased the serum gastrin concentration more in the patients with a duodenal ulcer than in the healthy subjects, and the differences were significant whether the absolute values were compared (mean rise 12 ng/l in controls versus 82 ng/l after isoproterenol, $p<0.01$) or the increase in serum gastrin expressed as a percent of the basal concentration was used (52% versus 94%, $p<0.05$). The rise in pulse rate, blood glucose concentration, and serum insulin was the same in both groups. Gastrin secretion was also increased significantly more in the patients than in the control subjects after a beef meal. Basal serum gastrin concentrations were higher in the patients than in the control subjects and correlated to the rise in serum gastrin during both tests in the duodenal ulcer patients. Isoproterenol- and meal-stimulated gastrin secretion, expressed as percent of the basal value, was twice as high in the patients as in the control subjects. The combined administration of isoproterenol and the meal had an additive effect on the rise in serum gastrin. Isoproterenol-stimulated gastrin secretion was completely suppressed by propranolol, which had no effect on meal-stimulated gastrin secretion. It is concluded that the mechanism of gastrin hypersecretion in patients with a duodenal ulcer does not involve a specific abnormality of the beta-adrenergic receptor or the receptor that recognizes proteins and their digested products. There is no established role of beta-adrenergic receptor activity in the hypersecretion of gastrin in patients with duodenal ulcers. It is suggested that the beta-adrenergic receptor may have some function unrelated to the acute secretory response of gastrin.

0365 EFFECTS OF PARENTERAL SECRETIN-CHOLECYSTOKININ AND OF DUODENAL ACID PERFUSION ON ASTRIC SECRETION IN DUODENAL ULCER PATIENTS. (Eng.) utt, J.; Yoshida, T.; Fleshler, B. (800 Stadium Rd., olumbia, MO 65201). *Am. J. Dig. Dis.* 22(4):371-78; 1977.

o investigate the possibility that failure of en-ogenous hormone(s) release by duodenal acidification ight play a role in the genesis of peptic ulcer isease, the effect of parenteral secretin-cholecys-okinin and duodenal acid perfusion on broth-stimu-ated gastric acid secretion was studied in 11 duo-enal ulcer patients. Statistically significant inhibition occurred in both experimental conditions. The effect of secretin-cholecystokinin was more marked than the effect of duodenal acid perfusion. A poorly responsive subgroup of patients appeared to be responsible for the diminished inhibitory effect of duodenal acid perfusion. In this poorly responsive group there was a diminished duodenal volume response as well as diminished duodenal acid clearing. It is concluded that there may exist a diminished release of gastrointestinal hormones such as secretin and cholecystokinin in certain duodenal ulcer patients.

0366 DIFFERENCES IN ANTRAL RESPONSE TO MEAT EXTRACT IN DUODENAL ULCER PATIENTS. (Eng.) Perreault, C.; Coutsoftides, T.; Himal, H. S. (Dept. Experimental Surgery, McGill Univ., Montreal, Canada). *Am. J. Gastroenterol.* 67(4):348-353; 1977.

The pathogenesis of duodenal ulcer formation and its relation to acid secretion (basal, antral, and peak) was studied in 59 duodenal ulcer and 12 normal subjects. Antral function was assessed by instilling meat extract solution into the stomach and then measuring acid and serum gastrin output. Peak acid output was significantly higher ($p<0.001$) in the patients (34.14 ± 1.64 mEq/l) than in the normal subjects (20.08 ± 3.79 mEq/l), but basal and peak gastrin values were not significantly different between the two populations. Two groups of duodenal ulcer patients were thus identified: (1) antral responders (31), in whom meat extract caused a significant ($p<0.001$) increase in serum gastrin output (from a basal value of 66.7 ± 7.1 to 153.3 ± 20.5 meat extract-stimulated gastrin output/ml) and acid output (from 4.57 ± 0.54 to 13.33 ± 1.16 mEq/l), and (2) antral nonresponders (28), in whom meat extract did not lead to a significant elevation in gastrin and acid output. The separation of duodenal ulcer patients into those who have or do not have a hyperfunctioning gastric antrum allows one to select the type of operation for each patient. In patients with a hyperfunctioning antrum, vagotomy and antrectomy are suggested; in those with a normal functioning antrum, vagotomy and drainage would be the procedures of choice.

0367 ROUTES OF FEEDING PATIENTS IN THE EARLY POSTOPERATIVE PERIOD IN ULCEROUS DISEASE. (Rus.) Zakharash, M. P. (Kiev Medical Inst., Kiev, USSR). *Vestn. Khir.* 118(5):45-48; 1977.

0368 SIGNIFICANCE OF THE ALIMENTARY FACTOR IN THE GENESIS AND RELAPSE OF PEPTIC ULCER. (Rus.) Budagovskaya, V. N.; Salnikova, G. M. (Inst. Nutrition, Acad. Medical Science, Moscow, USSR). *Vopr. Pitan. (Mosk.)* (3):54-59; 1977.

0369 DYNAMICS OF ACID AND ALKALINE COMPONENTS OF THE GASTRIC CONTENTS DURING THE COURSE OF TREATMENT OF GASTRODUODENITIS AND ULCER DISEASE. (Rus.) Voloshin, A. I.; Troyan, N. F.; Gotsuliak,

O. F. (Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* (6):86-88; 1977.

0370 PATHOPHYSIOLOGY OF PEPTIC ULCER DISEASES. (Fre.) Blum, A. (Stadtspital Triemli, Birmensdorferstrasse 497, 8063 Zurich, Switzerland). *Praxis* 66(18):541-543; 1977.

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0372 TREATMENT OF PEPTIC ULCERATION WITH HISTAMINE H_2-RECEPTOR ANTAGONISTS. (Ger.) Domschke, W.; Domschke, S.; Demling, L. (Med. Univ.-Klinik, Krankenhausstrasse 12, 852 Erlangen, W. Germany). *Fortschr. Med.* 95(31):1899, 1901-1902; 1977.

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0374 ISOENZYMES OF GASTRIC LIPASE IN MAN. (Pol.) Szafran, Z.; Popiela, T.; Wanicka, A.; Szafran, H.; Koscielniak, K. (Acad. Medicine, ul. Wielicka 265, 30-663 Krakow, Poland). *Przegl. Lek.* 34(4):413-417; 1977.

0375 POSTOPERATIVE RECURRENCE OF PEPTIC ULCER. (Ita.) Quaranta, L.; Segre, D.; Cartia, Q. (Ospedale Civili "S. Croce," Cuneo Ospedale Generale Provinciale, Italy). *Arch. Ital. Chir.* 100(2):177-187; 1977.

0376 EPIDEMIOLOGIC INVESTIGATION OF PEPTIC ULCER AMONG COAL MINERS: PART II. EFFECT OF OCCUPATIONAL FACTORS. (Pol.) Zahorski, W.; Marek, K.; Kujawska, A.; Klopotowski, J. (Kliniki Chorob Zawodowych Instytutu Medycyny Pracy, Sosnowcu, Poland). *Med. Prac.* 28(3): 207-216; 1977.

0377 GASTRINEMIA IN NORMAL SUBJECTS AND IN CASES OF DUODENAL ULCER: CORRELATION BETWEEN GASTRIC ACIDITY STIMULATED BY PENTAGASTRIN AND GASTRIN RESPONSE TO TEST MEAL. (Fre.) Fournet, J.; Fouque, B.; Hostein, J.; Maljournal, B.; Bonnet-Eymard, J. (CHU de Grenoble, Pavillon A, 38700 La Tronche, France). *Ann. Gastroenterol. Hepatol.* 13(3):185-194; 1977.

0378 REPEATED OPERATIONS IN PEPTIC ULCER. (Rus.) Trunin, M. A.; Plotnikov, Yu. V. (Leningrad Sanitary-Hygiene Medical Inst., Leningrad, USSR). *Khirurgiia (Mosk.)* (8):3-6; 1977.

0379 FUNCTIONAL CONDITION OF THE GALLBLADDER IN PATIENTS WITH DUODENAL ULCER. (Rus.) Galkin, V. A.; Rubin, M. P.; Khingeeva, S. L. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 49(6):81-84; 1977.

0380 PROTEOLYTIC ACTIVITY OF THE STOMACH IN PEPTIC ULCER. (Rus.) Gorshkov, V. A. (Leningrad Sanitary-Hygiene Medical Inst., Leningrad, USSR). *Klin. Med. (Mosk.)* 55(6):53-58; 1977.

0381 FUNCTIONAL CONDITION OF THE GASTRIC MUCOSA IN PATIENTS WITH UNCOMPLICATED PEPTIC ULCER. (Rus.) Kushnir, V. E. (A. A. Bogomoltsa Kiev Medical Inst., Kiev, USSR). *Klin. Med. (Mosk.)* 55(6):49-53; 1977.

0382 TREATMENT OF PATIENTS WITH THE JUVENILE FORM OF PEPTIC ULCER WITH DOCSA PREPARATION. (Rus.) Shirokova, K. I.; Lukasheva, M. V.; Ivanchenkova, R. A.; Smirnova, G. A. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 55(6):46-49; 1977.

0383 DUODENAL ULCER. I. SELECTION OF EXPLORATORY METHODS. (Fre.) Lambert, R.; Minaire, Y. (Hopital Edouard-Herriot, place d'Arsonval, F 69374 Lyon Cedex 2, France). *Nouv. Presse Med.* 6(7):551-554; 1977.

0384 A NEW APPROACH TO THE STUDY OF PEPTIC ULCER ETIOLOGY BY MEANS OF MULTIDIMENSIONAL STATISTICAL ANALYSIS. (Rus.) Loginov, A. S.; Salnikova, G. M.; Glazkova, T. G. (Central Inst. Gastroenterology, Moscow, USSR). *Ter. Arkh.* 49(2):3-8; 1977.

0385 DIFFERENTIAL DIAGNOSIS OF PEPTIC ULCER, CHRONIC GASTRITIS AND FUNCTIONAL DISEASES OF THE STOMACH IN CHILDREN. (Rus.) Belousov, Iu. V. (Ukrainian Inst. Advanced Medical Studies, USSR). *Pediatriia* (3):31-38; 1977.

0386 POSSIBLE IMPROVEMENT OF DUODENAL BULB ULCER DIAGNOSIS (ACCORDING TO THE DATA ON

LONG-TERM PROPHYLACTIC X-RAY EXAMINATIONS). (Rus.) Labetsky, I. I.; Tager, I. L. (4th Dept. of USSR Ministry of Public Health, Moscow, USSR). *Ter. Arkh.* 49(2):32-36; 1977.

0387 STUDY OF 400 FAMILIES WITH INCREASED INCIDENCE OF GASTRODUODENAL ULCER. DEDUCTIONS CONCERNING THE PATHOGENESIS OF ULCER. (Fre.) Dubarry, J. J. (Hopital Saint-Andre, 1, rue Jean-Burguet, 33000 Bordeaux, France). *Bull. Acad. Natl. Med. Paris* 160(1):54-60; 1976.

See also, 0065, 0097, 0102, 0252, 0292, 0306, 0327, 0335, 0340, 0346, 0349, 0357, 0358, 0361, 0410, 0510, 0737, 0746.

SMALL INTESTINE

0388 THE INTERDIGESTIVE MOTOR COMPLEX OF NORMAL SUBJECTS AND PATIENTS WITH BACTERIAL OVERGROWTH OF THE SMALL INTESTINE. (Eng.) Vantrappen, G.; Janssens, J.; Hellemans, J.; Ghoos, Y. (Dept. Medical Res., Univ. Leuven, Leuven, Belgium). *J. Clin. Invest.* 59(6):1158-1166; 1977.

To investigate whether the interdigestive motor complex identified in several animal species occurs in man, intraluminal pressures were measured in the gastric antrum and at different levels of the upper small intestine in 18 normal subjects. In all normal subjects, the activity front of the interdigestive motor complex was readily identified as an uninterrupted burst of rhythmic contraction waves that progressed down the intestine, and that was followed by a period of quiescence. Quantitative analysis of various parameters of the complex and simultaneous radiological and manometrical observations revealed that it resembled closely the canine interdigestive motor complex. To test the hypothesis that disorders of this motor complex may lead to bacterial overgrowth in the small intestine, similar studies were carried out in 18 patients with a positive $^{14}CO_2$ breath test and in 9 controls with a normal $^{14}CO_2$ breath test. All but five patients had normal interdigestive motor complexes. The five patients in whom the motor complex was absent or greatly disordered had bacterial overgrowth, as evidenced by $^{14}CO_2$ bile acid breath tests before and after antibiotics. These studies establish the presence and define the characteristics of the normal interdigestive motor complex in man. They also suggest that bacterial overgrowth may be due to a specific motility disorder, i.e., complete or almost complete absence of the interdigestive motor complex.

0389 JUXTAPAPILLARY DUODENAL DIVERTICULA AND ABNORMALITIES BY ENDOSCOPIC RETROGRADE CHOLANGIO-PANCREATOGRAPHY (ERCP). (Eng.) Osnes, M.; Myren, J.; Lotveit, T.; Swensen, T. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(3): 347-351; 1977.

The relationship between juxtapapillary duodenal diverticula and changes demonstrated by endoscopic retrograde cholangiopancreatography (ERCP) was investigated. In 174 patients, the biliary and pancreatic ducts were demonstrated by ERCP. Juxtapapillary diverticula were found in 5 of 84 patients with normal duct systems. In 90 cases of ductal abnormalities due to biliary concrements, dilated common bile duct, and pancreatitis, diverticula were found in 35. In patients with abnormalities in both duct systems, diverticula were found in 52%, and in patients with changes in one duct system, diverticula were found in 33%. The difference in occurrence of diverticula in patients with normal duct systems and pathological duct systems was statistically significant ($p<0.02$). The findings indicate a correlation between juxtapapillary diverticula and pathological changes due to biliary concrements, dilated common bile duct without concrements, and pancreatitis.

0390 CURRENT STATUS OF DIAGNOSIS AND MANAGEMENT OF STRANGULATION OBSTRUCTION OF THE SMALL BOWEL. (Eng.) Shatila, A. H.; Chamberlain, B. E.; Webb, W. R. (Southland Medical Building, Suite 128, 6867 Pearl Rd., Cleveland, OH 44130). *Am. J. Surg.* 132(3):299-303; 1976.

Consecutive case records of 50 patients treated for strangulation obstruction of the small bowel are compared with those of 53 patients treated for simple small bowel obstruction. Hernias were the most frequent cause of obstruction in the strangulation group (64%), followed by postoperative adhesions (32%). Postoperative adhesions were the most frequent cause of obstruction in the simple obstruction group (66%) followed by intra-abdominal malignancies (9.0%) and hernias (7.5%). The early differentiation between simple and strangulation obstruction by clinical criteria and laboratory tests was difficult, and strangulation obstruction was suspected preoperatively in only 25 strangulation cases. Abdominal pain, vomiting, abdominal distention, tachycardia, fever, abdominal tenderness, abdominal rebound, and palpable abdominal mass were common to both groups, with incidences of 96, 79, 68, 34, 19, 71, 8, and 9%, resp., in the simple obstruction group and incidences of 90, 86, 60, 44, 24, 86, 10, and 62%, resp., in the strangulation group. Abdominal wall rigidity (8%), shock (16%), hypothermia (10%), and rectal bleeding (8%) occurred only in the strangulation group and only in patients with late obstruction. Leukocytosis (WBC>11,000/mm^3), 79% neutrophilia or greater, elevated SGOT (>40 µU/ml), elevated LDH (>225 µU/ml), and elevated serum amylase (>200 Somogyi U/ml) were found in 45, 50, 32, 10, and 0%, resp., of the simple obstruction cases and in 62, 70, 46, 37, and 10%, resp., of the strangulation cases. Of 26 patients who had gangrenous bowel preoperatively, the classic signs of strangulation, i.e., fever, leukocytosis, and tachycardia, were absent in 70, 42, and 42%, resp., of these patients. Postoperative mortality was 8% in the strangulation group and 0% in the simple obstruction group. Overall morbidity was 42% in the strangulation group, with wound infections (10 cases), urinary tract infections (8 cases), and pulmonary complications (6 cases) being the most common. Early operation after rapid resuscitation is absolutely indicated for virtually all patients with acute mechanical small bowel obstruction. Patients with obstruction secondary to intra-abdominal carcinomatosis or radiation enteritis and patients with multiple recurrent episodes of intestinal obstruction secondary to adhesions may be excluded and benefit from a more conservative course of therapy.

0391 FAT DIGESTION AFTER JEJUNOILEAL BYPASS OPERATION FOR OBESITY. (Eng.) Sorensen, T. I. A.; Krag, E. (Gentofte Hosp., Univ. Copenhagen, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(5):491-495; 1976.

To investigate the etiology of steatorrhea following jejunoileal bypass, fat digestion in the upper jejunum was studied in 12 obese patients treated by jejunoileal bypass. Either 12.5 cm or 37.5 cm of the distal ileum was included in the bypass. The jejunum was intubated, and a test meal was ingested before and 1-2 months after operation. Jejunal aspirates were heated immediately to destroy lipase, pooled, and assayed for dilution marker, bile acids, and total fat. Lipolytic products were determined by thin-layer chromatography and densitometry. The micellar phase was achieved by ultracentrifugation and analyzed for total fat. Both the bile acid concentration and lipolysis decreased after both bypass operations ($p<0.05$ and $p<0.01$, resp.). In accordance with this, micellar solubilization of fat was impaired after the operation ($p<0.01$ after the first type of bypass; $p<0.05$ after the second type.). Bile acid concentration and micellar solubilization were lower after bypass with a long ileal loop than after bypass with a short ileal loop. Fat absorption in the duodenum and upper jejunum did not change significantly after any of the operations. Jejunoileal bypass impairs fat digestion, but this does not contribute significantly to postoperative fat malabsorption.

0392 ACUTE ADHESION-PRODUCED ILEUS. (Pol.) Miszczak, Z. (ul. Grottgera 5, 37-700 Przemysl, Poland). *Wiad. Lek.* 30(13):1001-1004; 1977.

0393 ASSESSMENT OF THE FUNCTIONAL AND MORPHOLOGICAL CONDITION OF THE LIVER IN PATIENTS PREPARED FOR SURGICAL TREATMENT OF OBESITY. (Pol.) Tuszewski, M. (Acad. Medicine, ul. Przybyszewskiego 49, 60-355 Poznan, Poland). *Pol. Tyg. Lek.* 32(36):1393-1395; 1977.

0394 FACTORS CONTRIBUTING TO DUODENAL STENOSIS CAUSED BY SUPERIOR MESENTERIC ARTERY COMPRESSION. (Pol.) Gagala, C.; Kawalski, A.; Kozicki, I.; Kaminski, P.; Zawakzki, J. J. (Klinika Chirurgii Ogolnej CMKP, ul. Czerniakowska 231, 00-416 Warszawa, Poland). *Pol. Tyg. Lek.* 32(35):1352-1355; 1977.

0395 PRIMITIVE DUODENAL CARCINOMA. (Spa.) de la Gandara, F. F.; Gonzalez Fernandez, F.; de Andres, A.; San Jose, G.; Peral Martinez, I. (Facultad de Medicina de Valladolid, Valladolid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(5):549-556; 1977.

0396 HEMOPERITONEUM AS A RARE COMPLICATION OF MECKEL'S DIVERTICULUM: A CASE REPORT. (Ger.) Frank, G.; Reichel, K. (Medizinischen Hochschule Hannover, Karl-Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *Chirurg* 48(4):238-240; 1977.

0397 A CASE OF LARGE ILEUM CARCINOIDOSIS WITH HEART DISEASE. (Spa.) Lapertosa, G.; Gatteschi, B. (Istituto di Anatomia e Istologia Patologia dell'Universita di Genova, Genova, Italy). *Pathologica* 69(991/992):315-324; 1977.

0398 LATE ILEAL METASTASES FROM A SKIN MELANOMA WITH MAINLY HEMORRHAGIC SYMPTOMS: REPORT OF ONE CASE. (Fre.) Chometowski, S.; Nguyen Cat, R.; Assadourian, R.; Bourde, J.; Lamy, J. (45, rue de Paris, 92220 Bagneux, France). *J. Chir. (Paris)* 113(5/6):537-542; 1977.

0399 DOUBLE-CONTRAST TECHNIQUE FOR DIAGNOSTICS OF THE LARGE INTESTINE. (Ger.) Schilling, T. (Israelitisches Krankenhaus in Hamburg, Orchiedeenstieg 14, 2000 Hamburg 60, W. Germany). *Roentgenblaetter* 30(8):388-399; 1977.

0400 THE BLIND LOOP SYNDROME FOLLOWING INTESTINAL ANASTOMOSIS. (Ger.) Lynen, F. K.; Raguse, T. (St.-Elisabeth Krankenhaus, 5130 Gelsenkirchen, W. Germany). *Aktuel. Chir.* 12(2):247-254; 1977.

0401 THE POSSIBILITIES OF ARTERIOGRAPHY IN ILEOCECAL INVAGINATION. (Cze.) Chvojka,

J. (Rentgenologicke oddeleni Vojenske nemocnice, 304 46 Plzen, Czechoslovakia). *Cesk. Radiol.* 31 (3):172-178; 1977.

0402 RECURRENT MELENA DUE TO INTRA-ILEAL FISSURE OF A FALSE ILIAC ANEURYSM: TREATMENT--CURE. (Fre.) Doutre, L. P.; Masson, 3.; Pernot, F.; Houdelette, P. (Clinique Chirurgicale A, 311, boulevard du President Wilson, 33200 Bordeaux, France). *Chirurgie* 103(6):424-429; 1977.

0403 CHRONIC ULCERATIVE JEJUNOILEITIS WITH MALABSORPTION. (Fre.) Gouerou, H.; Redelsperger, P. Y.; Galian, A.; Dervichian, M.; Pappo, E.; Cattan, D. (Nouvel Hopital, F 94190 Villeneuve-Saint-Georges, France). *Gastroenterol. Clin. Biol.* 1(6/7):561-570; 1977.

0404 TECHNICAL FAILURES IN SMALL BOWEL SURGERY. (Ger.) Kummerle, F.; Seitz, W. (Chirurgischen Universitatsklinik Mainz, Langenbeckstr. 1,)-6500 Mainz 1, W. Germany). *Zentralbl. Chir.* 102(17):1045-1053; 1977.

0405 RESISTANCE TO INFECTION OF DIGESTIVE SUTURES: EXPERIMENTAL STUDY. (Fre.) Bellamy, J.; Brunschvicg, O.; Fekete, F.; Lortat-Jacob, J. L. (Hopital Beaujon, 100, avenue du General-Leclerc, 92 Clichy, France). *J. Chir. (Paris)* 113(3):319-324; 1977.

0406 JEJUNO-ILEAL SHORT-CIRCUIT OPERATIONS IN THE TREATMENT OF OBESITY: 16 PERSONAL CASES. (Fre.) Leger, L.; Moulle, P.; Chiche, B.; Louvel, A. (16, rue de Teheran, 75008 Paris, France). *J. Chir. (Paris)* 113(3):229-248; 1977.

0407 EARLY SURGICAL TREATMENT OF COMPLICATIONS OF JEJUNAL DIVERTICULOSIS. (Fre.) nsay, J. (Hopital Universitaire Brugmann, 1020 russels, Belgium). *Lyon Chir.* 73(3):204-206; 977.

0408 RADIOLOGICAL EXAMINATION OF SMALL INTESTINE AFTER JEJUNOILEAL BYPASS OPERATION FOR XTREME OBESITY. (Pol.) Flejsierowicz, Z.; Stawny, .; Tuszewski, M. (Acad. Medicine, ul. Szkolna 8/12, 1-833 Poznan, Poland). *Pol. Przegl. Med. Nukl.* 1(2):131-134; 1977.

409 SUTURE TECHNIQUE IN INTESTINAL ANASTOMOSIS. (Ger.) Herzog, B. (Kinderspital, Romergase 8, CH-4005, Switzerland). *Langenbecks Arch. Chir.* 44(1):1-5; 1977.

410 SIMPLE ULCER OF THE SMALL INTESTINE. (Ita.) Siciliani, M.; Tondo, A.; Rago, E. (Ospedale Riuniti di Napoli, Naples, Italy). *Rass. Int. Clin. Ter.* 57(9):612-617; 1977.

0411 DISEASES OF THE ORGANS OF THE ABDOMINAL CAVITY AND RETROPERITONEAL SPACE SIMULATING ACUTE APPENDICITIS IN CHILDREN. (Rus.) Akzhigitov, G. N. (Volgograd Medical Inst., Volgograd, USSR). *Vestn. Khir.* 119(8):118-121; 1977.

0412 CLINICAL SIGNIFICANCE OF TRANSIT TIME AND REFLUX FOLLOWING SMALL INTESTINAL SHUNT OPERATION. (Ger.) Husemann, B.; Muhrer, K. H.; Holik, B. (Chirurgische Univ.-Klinik, Maximiliansplatz, D-8520 Erlangen, W. Germany). *Chirurg* 48 (1):42-45; 1977.

0413 PEUTZ-JEGHER'S SYNDROME: REPORT OF ONE CASE. (Fre.) Devic, G.; Gelain, J. (46 bld de la Republique, F. 38200 Vienna, Austria). *Lyon Chir.* 73(3):209-210; 1977.

0414 DUODENOGASTRIC REFLUX. (Ger.) Rothmund, M. (Universitat Mainz, Chirurgische Klinik, Langenbeckstr. 1, 6500 Mainz, W. Germany). *Z. Gastroenterol.* 15(3):192-201; 1977.

0415 DECOMPRESSIVE OPERATION IN DUODENAL STASIS. (Rus.) Smirnov, E. V. (No affiliation given). *Khirurgiia (Mosk.)* (3):5-9; 1977.

0416 PERFORATION OF THE SMALL INTESTINE DURING THE PROPHYLAXIS OF THROMBOEMBOLISM WITH OXYPHENOBUTAZONE (TANDERIL). (Fre.) Chaneliere, N.; Bourgeois, M.; Mathieu, M. F. (33 avenue A.-Briand, 39000 Lons-le-Saunier, France). *Lyon Chir.* 73(2):150-151; 1977.

0417 POTASSIUM CHLORIDE AND UNSPECIFIC ULCER OF THE SMALL INTESTINE. (Fre.) Dayer, P.; Cech, P.; Courvoisier, B. (Hopital cantonal, CH-1211 Geneva 4, Switzerland). *Schweiz. Med. Wochenschr.* 107(11):379-380; 1977.

0418 CATAMNESTIC INVESTIGATION OF 82 PATIENTS WITH UNSPECIFIC CHANGES OF THE SMALL INTESTINAL MUCOSA. (Ger.) Morger, H.; Shmerling, D. H. (Kinderspital, Steinwiesstrasse 75, CH-8032 Zurich, Switzerland). *Helv. Paediatr. Acta* 31(6): 453-462; 1976.

0419 INVOLVEMENT OF JOINTS IN INTESTINAL DISEASES. (Ger.) Tanner, E.; Bosseckert, H.; Fritze, Ch.; Seidel, K. (Spezialklinik fur Rheumakranke, DDR-6821 Etzelbach, E. Germany). *Dtsch. Gesundheitsw.* 32(12):529-533; 1977.

0420 CREATION OF INTESTINAL VALVE. A NEW METHOD. (Fre.) Zambouras, D. A. ("Agia Olga" General

State Hosp., N. Ionia-Athens, Greece). *Nouv. Presse Med.* 6(10):847-849; 1977.

0421 TREATMENT OF DIARRHEA SECONDARY TO INTESTINAL RESECTION. (Fre.) Le Quintrec, Y.; Gendre, J. P. (Hopital Rothschild, 43, bd de Picpus, 75571 Paris Cedex 12, France). *Sem. Hop. Ther.* 53(3): 177-180; 1977.

0422 SIMULTANEOUS COLOSTOMY AND ILEOSTOMY: ILEOSTOMY WITH AUTONOMOUS AND CONTINENT SPHINCTER. (Fre.) Palma, E. C. (21 de Setiembre 2385, Montevideo, Uruguay). *Lyon Chir.* 73(4): 311-316; 1977.

See also, 0003, 0085, 0244, 0245, 0247, 0263, 0279, 0283, 0290, 0292, 0297, 0298, 0299, 0300, 0319, 0327, 0338, 0361, 0370, 0386, 0387, 0438, 0451, 0454, 0484, 0695, 0700, 0717, 0722, 0723, 0731, 0732, 0736, 0740, 0756, 0757, 0758.

SMALL INTESTINE

Malabsorption

0423 JEJUNAL PERFUSION OF SIMPLE AND CONJUGATED FOLATES IN CELIAC SPRUE. (Eng.) Halsted, C. H.; Reisenauer, A. M.; Romero, J. J.; Cantor, D. S.; Ruebner, B. (Sch. Medicine, Univ. California, Davis, CA 95616). *J. Clin. Invest.* 59(5):933-940; 1977.

The intestinal absorption of [^{3}H]pteroylmonoglutamate (simple folic acid) and pteroyl-μ[^{14}C]glutamyl-γ-hexaglutamate ([^{14}C]PG-7, conjugated folic acid) was assessed by the method of jejunal perfusion in five patients with proven celiac sprue who were studied after a gluten-containing or a gluten-free diet, and in nine normal subjects. The luminal disappearance of each folate was markedly impaired after exposure of the patients to dietary gluten in comparison with that in patients on a gluten-free diet ($p<0.02$ for [^{3}H]PG-1, $p<0.01$ for [^{14}C]PG-7), but the levels in the celiac patients on the gluten-free diets did not come within the range found in the normal subjects. Column chromatography of the luminal aspirates revealed similar spectra of hydrolytic products of {^{14}C]PG-7, whereas the fraction of the distal aspirate chromatogram appearing as pteroyl-μ[^{14}C]glutamyl-γ-monoglutamate ([^{14}C]-PG-1) was similar in all three groups. By accounting for the variable effects of absorption on the luminal appearance of [^{14}C]PG-1 and by correcting for mucosal hydrolysis that was not followed by release of [^{14}C]PG-1 to the luminal contents, the calculated rate of *in vivo* hydrolysis of [^{14}C]-PG-7 to [^{14}C]PG-1 was found to be impaired in both celiac sprue groups, with significant improvement on treatment. In mucosal biopsies from the sprue patients, the *in vitro* activity of folate conjugase in whole homogenates was higher and the activity of disaccharidase lower than in a group of 12 normal mucosal biopsies. These *in vitro* data suggest that the predominant cellular location of mucosal folate conjugase is different from that of disaccharidase, whereas comparison with the results of *in vivo* hydrolysis suggests that measurement of the enzyme in whole mucosal homogenates overestimates its significant digestive activity. These studies indicate that the mucosal lesion of celiac sprue significantly limits the intestinal absorption of both simple and conjugated folate, and that malabsorption of conjugated folate results from a combination of impaired hydrolysis and decreased mucosal uptake of hydrolytic product.

0424 PHARMACOKINETICS OF SALICYLATE AND INDOMETHACIN IN COELIAC DISEASE. (Eng.) Parsons, R. L.; Kaye, C. M.; Raymond, K. (Guy's Hosp., St. Thomas St., London SE1 9RT, England). *Eur. J. Clin. Pharmacol.* 11(6):473-477; 1977.

To determine whether the abnormal plasma concentration/time curve of lipid soluble drugs seen in celiac disease is related to their pKa, the plasma concentrations of salicylate and indomethacin were measured after a single p.o. dose of aspirin (600 mg) or indomethacin (50 mg) in 12 starved normal subjects and in 12 adult patients with celiac disease. The absorption of salicylate in the celiac patients was faster than that in the normal subjects. The plasma concentration/time curve of indomethacin in both groups was similar during the absorption phase, but there were significant differences between the groups in its elimination. The abnormal absorption pattern of salicylate in celiac disease does not appear to be related to its pKa. Possible causes of the difference in salicylate absorption include changes in gastric emptying or altered small intestinal permeability.

0425 DEPRESSED CELL-MEDIATED IMMUNITY IN COELIAC DISEASE. (Eng.) Scott, B. B.; Losowsky, M. S. (St. James' Hosp., Leeds, England). *Gut* 17(11): 900-905; 1976.

Phytohemagglutinin (PHA)-induced lymphocyte transformation was used to assess the integrity of cell-mediated immunity (CMI) in 10 untreated celiac patients on a normal diet, 14 celiac patients treated with a gluten-free diet (GFD), and 13 healthy controls. Untreated celiac patients had significantly reduced transformation compared with controls in both autologous and pooled AB serum ($p<0.02$). Treated celiac patients had significantly reduced transformation in autologous serum ($p<0.05$) but not in pooled AB serum ($p>0.1$). Responses to PHA in treated patients were significantly higher than in untreated patients in pooled AB serum ($p=0.03$) but not in autologous serum ($p=0.06$). Responses to PHA in pooled AB serum were significantly higher than in autologous serum in patients on a GFD ($p=0.04$) but not in celiac patients on a normal diet ($p=0.16$). The improvement in CMI after treatment was particularly apparent in six celiac patients studied on both a normal diet and a GFD. Lymphocytotoxic antibodies were detected in only three patients, and lymphocyte transformation was more depressed in autologous serum in two of these patients. No correlation was established between lymphocyte transformation and nutritional deficiency. Only 22% of the celiac patients had positive Mantoux tests compared with 85% of the controls ($p<0.001$). Two patients who were tested before and after *Bacillus Calmette-Guerin* vaccination remained negative, although one had responded well to the GFD. Mantoux tests were as commonly negative in treated as in untreated patients. CMI depression in celiac disease may be partly explained by an undefined depressing serum factor. If depressed immunity in celiac disease is related to the development of malignancy, the case for a strict GFD in all patients is reinforced by the improved CMI as assessed by lymphocyte transformation in GFD-treated patients.

0426 CELL-MEDIATED AUTOIMMUNITY IN COELIAC DISEASE. (Eng.) Scott, B. B.; Losowsky, M. S. (Univ. Dept. Medicine, St. James' Hosp., Leeds, LS9 7TF, England). *Clin. Exp. Immunol.* 26(2):243-246; 1976.

Lymphocyte transformation in response to a crude freeze-dried preparation of whole jejunal mucosa was studied in 15 patients with celiac disease and compared with the findings in 15 age-matched controls. The transformation ratio was markedly increased in three patients. The patients with the highest and third highest ratios were on a gluten-free diet, while the other responders were on a normal diet. These observations suggest the possible existence of cell-mediated autoimmunity to jejunal mucosa in some patients with celiac disease and might be relevant to the development of some of the complications of the disease.

0427 HYPOTHYROIDISM AND COELIAC DISEASE. A FAMILY STUDY. (Eng.) McCarthy, D.; Manning, N.; Rees, J. P. R.; Drury, M. I. (Mater Misericordiae Hosp., Dublin, Ireland). *Ir. J. Med. Sci.* 145(7):237-238; 1976.

0428 VITAMIN B_6 NUTRITURE OF CHILDREN WITH ACUTE CELIAC DISEASE, CELIAC DISEASE IN REMISSION, AND OF CHILDREN WITH NORMAL DUODENAL MUCOSA. (Eng.) Reinken, L.; Zieglauer, H.; Berger, H. (Dept. Pediatrics, Univ. Innsbruck, Innsbruck, Austria). *Am. J. Clin. Nutr.* 29(7):750-753; 1976.

0429 CEROID ENTEROPATHY AND VITAMIN E DEFICIENCY. (Eng.) Lee, S. P.; Nicholson, G. I. (Auckland Hosp., Auckland, New Zealand). *N.Z. Med. J.* 83(563):318-320; 1976.

0430 POLYMYOSITIS AND OTHER MYOPATHIES AS PRINCIPAL FEATURE IN GLUTEN-SENSITIVE ENTEROPATHY [Abstract]. (Eng.) Hallert, C.; Walan, A.; Henriksson, K. G. (Dept. Internal Medicine, Univ. Linkoping, S-581 85 Linkoping, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):30; 1977.

0431 BILE SALT ABSORPTION IN COELIAC DISEASE [Abstract]. (Eng.) Gillberg, R.; Andersson, H. (Sahlgren's Hosp., Goteborg, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):24; 1977.

0432 THE NATURE OF GLUTEN TOXICITY IN COELIAC DISEASE [Abstract]. (Eng.) Fottrell, P. F.; Phelan, J.; Stevens, F.; McNicholl, B.; McCarthy, C. F. (Dept. Biochemistry, Univ. Coll., Galway, Ireland). *J. Anat.* 124(2):490: 1977.

0433 EFFECT OF FOLATE DEFICIENCY ON MUCOSAL DNA SYNTHESIS DURING RECOVERY FROM TROPICAL MALABSORPTION (TM) [Abstract]. (Eng.) Tomkins, A. M.; McNurlan, M.; Wright, S. (Hosp. Tropical Diseases, London, England). *Gut* 18(11): A945; 1977.

0434 INCREASED PREVALENCE OF EPILEPSY IN COELIAC DISEASE [Abstract]. (Eng.) Laidlow, J. M.; Chapman, R. G.; Colin-Jones, D. G.; Eade, O.; Smith, C. L. (Royal Hosp., Portsmouth, England). *Gut* 18(11):A943; 1977.

0435 CHOLECYSTOKININ ABNORMALITIES IN COELIAC DISEASE [Abstract]. (Eng.) Polak, J. M.; McCrossan, M. V.; Timson, C. M.; Johnston, D. R.; Hudson, D.; Szelke, M.; *et al.* (Royal Postgraduate Medical Sch., London, England). *Gut* 18(11):A942; 1977.

0436 SERIAL LIGHT AND ELECTRON MICROSCOPY OF INTESTINAL MUCOSA IN WHIPPLE'S DISEASE [Abstract]. (Eng.) Mills, P.; More, I.; Dick, A.; Holden, R.; Watkinson, G. (Western Infirmary, Glasgow, Scotland). *Gut* 18(11):A970; 1977.

0437 DIAGNOSIS OF HYPERSENSITIVITY TO COW'S MILK IN DIGESTIVE TRACT DISEASES. (Pol.)

Waligora, J.; Martynow, S.; Fedorenko, T.; Fedorenko, W. (Instytutu Medycyny we Lwowie, Lvov, USSR). *Pol. Prezegl. Chir.* 49(6):599-603; 1977.

0438 GALLBLADDER INERTIA AND CELIAC DISEASE: EFFECT OF GLUTEN-FREE DIET ON GALLBLADDER FUNCTION. (Fre.) Delamarre, J.; Joly, J. P.; Capron, J. P.; Chivrac, D.; Dupas, J. L.; Gontier, M. F.; Lorriaux, A. (Centre Hospitalier Universitaire, place Victor-Pauchet, F 80030 Amiens, France). *Gastroenterol. Clin. Biol.* 1(4):365-368; 1977.

See also, 0016, 0125, 0288, 0301, 0388, 0391, 0403, 0406, 0419, 0504, 0675, 0718, 0740, 0755, 0756.

LARGE INTESTINE

0439 GEOGRAPHIC PATTERNS OF LARGE BOWEL CANCER IN THE UNITED STATES. (Eng.) Blot, W. J.; Fraumeni, J. F.; Stone, B. J.; McKay, F. W. (Natl. Cancer Inst., U.S. Dept. Health, Education, and Welfare, Bethesda, MD 20014). *J. Natl. Cancer Inst.* 57(6):1225-1231; 1976.

Age-adjusted colon and rectal cancer mortality rates during 1950-1969 were correlated by sex and race (white and nonwhite) with demographic data for 3,056 counties of the contiguous United States. Mortality from both types of cancer was consistently elevated in counties with large populations and with higher income and education levels. Geographically, mortality rates for both types of cancer were highest in the northeast and lowest in the southeast. The death rates among whites with colon cancer were generally higher for women than for men, except in highly populous counties where the situation was reversed. Colon cancer mortalities were highest in counties with relatively high percentages of people of Irish, Czechoslovak, or German descent. The death rate for rectal cancer among whites was greater among men than among women. However, the male/female mortality ratio for rectal cancer rose with increasing population size, similar to a pattern seen for colon cancer. Rectal cancer death rates among whites were highest in counties with a high percentage of residents of Greek, Irish, and German stock. Colorectal cancer mortality rate patterns for nonwhites of both sexes resembled those for whites. Colon cancer mortality rates in both sexes were higher among whites than nonwhites, especially in the north. Rectal cancer mortality rates in men likewise were higher among whites than nonwhites in the north; however, no racial differences were found in the south. For women, the rectal cancer death rates were slightly higher among whites in the north but slightly higher among nonwhites in the south. Colon cancer mortality among nonwhites was higher in women than in men, except in populous northern counties where the rates were about equal. Rectal cancer was more common among men than among women in nonwhites, though the sex difference was not as great as it was among whites. A survey on dietary habits by region and on alcohol sales by county failed to show an impressive correlation with bowel cancer mortality. The geographical variations in colorectal cancer mortality rate may be helpful in the identification of dietary and other environmental determinants of large bowel tumors.

0440 LINCOMYCIN-CLINDAMYCIN COLITIS IS NOT AN ENTITY. (Eng.) Devroede, G.; Poisson, J.; Madarnas, P.; Beaudry, R.; Haddad, H.; Strom, B.; *et al.* (Centre Hospitalier Universitaire Sherbrooke, Quebec J1H 5N4, Canada). *Can. J. Surg.* 20(4):326-335; 1977.

From 1969 to 1975, 10 cases of pseudomembranous colitis (PC, group I) and 13 cases of nonpseudomembranous colitis (NPC, group II) developed as a result of ingestion of antibiotics. All patients recovered after the administration of clindamycin plus steroids. During this period, an erroneous diagnosis of PC was made in three patients (later diagnosed as having ulcers) who had not received antibiotics but had focal accumulation of pus on the rectal mucosa and were chronically ill. The penicillin class of antibiotics was responsible for colitis in six group I patients and five in group II, compared with three and five patients, resp., for the lincomycin-clindamycin class. Patients with PC were more seriously ill than those with NPC, and their disease lasted longer (31 versus 15 days, $p<0.01$). PC patients had more frequent abdominal distention ($p<0.001$), a faster pulse rate ($p<0.05$), and a higher temperature ($p<0.001$) or one of longer duration ($p<0.001$). The WBC count was higher in PC patients ($p<0.005$), and values for serum protein ($p<0.001$), hemoglobin ($p<0.005$), potassium ($p<0.001$), sodium ($p<0.05$), and total carbon dioxide ($p<0.025$) were lower. Seven NPC patients had target lesions in the rectosigmoid mucosa. At follow-up endoscopy, pseudomembranes were not present even if the disease had not been of shorter duration ($p>0.05$) than that of the PC patients. Although NPC and PC have different clinico-pathological manifestations, they may be of identical etiology. It is concluded that use of the term lincomycin-clindamycin colitis is unjustified.

0441 INTRALUMINAL PRESSURE IN THE SIGMOID COLON. II. PATIENTS WITH SIGMOID DIVER-

TICULA AND RELATED CONDITIONS. (Eng.) Weinreich, J.; Andersen, D. (Surgical Univ. Clinic I, Aarhus Amtssygehus, DK-8000 Aarhus C, Denmark). *Scand. J. Gastroenterol.* 11(6):581-586; 1976.

Sigmoid pressure activity was measured in 188 patients with various colonic diseases to determine whether pathophysiological similarities exist in these entities. The clinical syndromes included chronic diverticular disease (62 patients), colonic diverticulosis (15), atypical diverticular disease (36), acute diverticular disease (26), colicky sigmoid syndrome (15), sigmoid syndrome with predominant diarrhea (8), sigmoid syndrome with predominant constipation (16), and sigmoid syndrome with vague dyspepsia (10). The last four groups refer to what is generally known as the irritable bowel syndrome. Intraluminal sigmoid pressure was determined after the administration of neostigmine (0.5 mg, i.v.). Analysis of variance indicated that patients with chronic diverticular disease, patients with acute diverticular disease, and patients with the colicky sigmoid syndrome all might belong to a single population with respect to pressure activity; the median motility indices in the three groups were 1,996, 1,469, and 1,815, resp. Patients in the other categories showed pressure activities similar to those previously reported in normal subjects.

0442 TOTAL BILE ACIDS IN PORTAL VENOUS SERUM: A QUALITATIVE AND QUANTITATIVE ASSESSMENT [Abstract]. (Eng.) Holzbach, R. T.; Marsh, M. (Cleveland Clinic Foundation, Cleveland, OH). *Gastroenterology* 73(5):1225; 1977.

0443 MALLORY-WEISS LESION FOLLOWING CANCER CHEMOTHERAPY [Letter to Editor]. (Eng.) Enck, R. E. (William Beaumont Army Medical Center, El Paso, TX 79920). *Lancet* 2(8044):927-928; 1977.

0444 ERYTHEMA NODOSUM PRESENTING BEFORE INFLAMMATORY BOWEL DISEASE [Letter to Editor]. (Eng.) Linaker, B. D. (Broadgreen Hosp., Liverpool, England). *Lancet* 2(8044):931; 1977.

0445 INSTRUMENTAL-ENDOSCOPIC-PERFORATIONS OF THE COLON AND RECTUM [Abstract]. (Eng.) Filler, D.; Hermstein, N.; Groitl, H. (Dept. Surgery, Univ. Giessen, Giessen, W. Germany). *Endoscopy* 9(3):195; 1977.

0446 EXPERIENCES IN 528 COLOSCOPIC POLYPECTOMIES [Abstract]. (Eng.) Otto, P.; Bunnemann, H.; Huchzermeyer, H.; Muller, H. (Kreiskrankenhaus Grossburgwedel, Hannover, W. Germany). *Endoscopy* 9(3):194; 1977.

0447 COLONOSCOPE TYPE CF-LB3 (OLYMPUS)--A ROUTINE INSTRUMENT FOR COMPLETE COLOSCOPY [Abstract]. (Eng.) Mockel, W. (Innere Abt. Ev. Krankenhaus Koln-Kalk, Koln, W. Germany). *Endoscopy* 9(3):193; 1977.

0448 PROCTOSIGMOIDOSCOPY IN CHILDREN. ANALYSIS OF RESULTS [Abstract]. (Eng.) da Silva Kotze, L. M. (No affiliation given). *Arq. Gastroenterol.* 14(3):159; 1977.

0449 EXPLOSION OF HYDROGEN GAS IN THE COLON DURING PROCTOSIGMOIDOSCOPY. (Eng.) Bond, J. H.; Levy, M.; Levitt, M. D. (Minneapolis Veterans Admin. Hosp., Minneapolis, MN). *Gastrointest. Endosc.* 23(1):41-42; 1976.

0450 FUNCTION STATE OF INTESTINE IN COLONIC POLYPOSIS (A CLINIC RADIOLOGICAL EXAMINATION. (Ger.) Keves, E. L.; Pyteva, G. P.; Bychovskaja, A. M.; Katorkin, E. N. (Kujbyschewer Med. D.I. Uljanow Inst., Kujbyschev, USSR). *Radiol. Diagn. (Berl.)* 17(3):401-407; 1976.

0451 CLINICAL FEATURES OF NEONATAL OCCLUSION: MANAGEMENT. (Fre.) Frappat, P.; Dyon, J. F.; Baudain, Ph. (No affiliation given). *Rev. Fr. Gastroenterol.* (118):7-51; 1976.

0452 IMPORTANCE OF CHANGES IN THE GASTROINTESTINAL MUCOSA IN DISTURBANCES OF THE MEDIATOR MECHANISM IN ALLERGIC AND DYSENTERY COLITIS. (Rus.) Shenkman, B. Z. (Saratov Medical Inst., Saratov, USSR). *Patol. Fiziol. Eksp. Ter.* (3):77-79; 1977.

0453 INTESTINAL INTUBATION THROUGH 9 GASTROSTOMA IN ILEUS IN CHILDREN. (Rus.) Gadzhimirzaev, G. A.; Arbuliev, M. G.; Ashurbekov, V. T.; Medzhidov, R. (Dagestan Medical Inst., Makhachkala, USSR). *Khirurgiia (Mosk.)* (8):42-45; 1977.

0454 TREATMENT OF PATIENTS WITH EXTERNAL INTESTINAL FISTULAS. (Rus.) Maloman, E. N.; Zhabanovskii, V. E. (Kishinev Medical Inst., Kishinev, USSR). *Khirurgiia (Mosk.)* (8):45-50; 1977.

0455 IMMEDIATE RESULTS OF COMBINED TREATMENT OF LARGE INTESTINE CANCER. (Rus.) Panshin, G. A. (Moscow Scientific Res. Inst. Rentgenoradiology, Ministry Health USSR, Moscow, USSR). *Med. Radiol. (Mosk.)* 22(8):13-19; 1977.

0456 SOME ASPECTS OF SURGICAL TREATMENT OF HEMORRHOIDS. (Rus.) Askerkhanov, R. P. (Dagestan Medical Inst., Makhachkala, USSR). *Vestn. Khir.* (6):86-89; 1977.

0457 THE DIFFERENTIAL DIAGNOSIS BETWEEN GYNECOLOGICAL DISEASES AND ACUTE APPENDI-

CITIS IN YOUNG PERSONS. (Rus.) Podonenko-Bogdanova, A. P. (Donetsk Medical Inst., Donetsk, USSR). *Vestn. Khir.* (6):70-72; 1977.

0458 CONGENITAL MEGACOLON: TECHNIQUE AND RESULTS. (Fre.) Soave, F. (Departement de chirurgie pediatrique du Gaslini, Universite de Genes, Genoa, Italy). *Ann. Chir. Infant.* 18(3): 183-207; 1977.

0459 COLONIC COMPLICATIONS FOLLOWING RENAL TRANSPLANTATION. (Fle.) Lerut, J.; Lerut, T.; Gruwez, J. A.; Michielsen, P. (Academisch Ziekenhuis St. Rafael Leuven, Capucienevoer 3000 Leuven, Belgium). *Tijdschr. Gastroenterol.* 20(1): 29-41; 1977.

0460 DIVERTICULITIS OF THE CECUM: REPORT OF FIVE CASES OF SOLITARY DIVERTICULITIS. (Fre.) Bahadoran, H. (Eghbal Hosp., Teheran, Iran). *Chirurgie* 103(5):293-300; 1977.

0461 RETROPERITONEAL SUPPURATION SECONDARY TO PERFORATION OF AN ISOLATED DIVERTICULUM OF THE CECUM. (Fre.) Lagache, G.; Combemale, B.; Richet, F.; Bahon le Capon, J. (No affiliation given). *Chirurgie* 103(5):301-304; 1977.

0462 FORMATION OF PRETERNATURAL ANUS WITH A CUTANEOUS-INTESTINAL VALVE. (Rus.) Bondar, G. V.; Fefelov, A. I. (Donetsk Medical Inst., Donetsk, USSR). *Khirurgiia (Mosk.)* (8): 87-90; 1977.

0463 FUNCTIONAL AND MORPHOLOGICAL CHANGES IN OPERATIONS ON SPHINCTER ANI. (Rus.) Selivanov, V. I.; Teslenko, N. I.; Selivanov, A. V. (Crimean Medical Inst., USSR). *Khirurgiia (Mosk.)* (8):84-87; 1977.

0464 IRRIGATION OF THE INTESTINE IN PATIENTS WITH PRETERNATURAL ANUS. (Rus.) Gerasimenko, V. N.; Protchenko, N. V.; Artyushenko, Yu. V.; Gegenava, Sh. P. (Oncological Science Center, Moscow, USSR). *Khirurgiia (Mosk.)* (8):90-95; 1977.

0465 HEREDITY OF IMPERFORATE ANUS: REPORT OF A CASE. (Ger.) Bolkenius, M.; Daum, R. (Chirurgischen Zentrums d. Univ. Heidelberg, 6900 Heidelberg, W. Germany). *Z. Kinderchir.* 20(4):369-374; 1977.

0466 RELAPAROTOMY AFTER RADICAL OPERATIONS FOR RECTAL CANCER. (Rus.) Petrov, V. P. (No affiliation given). *Vestn. Khir.* 118(5):58-63; 1977.

0467 APPENDICULAR ABCESS PRESENTING AS AN ABDOMINAL MASS IN EARLY CHILDHOOD: RADIOLOGICAL DIAGNOSIS. (Fre.) Baudain, Ph.; Coupris, L.; Revillon, Y.; Sauvegrain, J. (Hopital des Enfants-Malades, 149, rue de Sevres, F 75730 Paris Cedex 15, France). *J. Radiol. Electrol.* 58(6/7):445-449; 1977.

0468 CHEILITIS GRANULOMATOSA AND CROHN'S DISEASE. (Ger.) Kint, A.; De Brauwere, D.; De Weert, J.; Hendrickx, R. (Dermatol. Klinik und Poliklinik der Universitat Gent, De Pintelaan, 135, B-9000 Gent, Belgium). *Hautarzt* 28(6):319-321; 1977.

0469 DIVERTICULAR DISEASE OF THE SIGMOID COLON. (Ger.) Filippini, L. (Medizinische Klinik, Kantonsspital, 6004 Luzern, Switzerland). *Praxis* 66(10):295-302; 1977.

0470 RESULTS OF SURGICAL TREATMENT FOR CANCER OF THE COLON. (Rus.) Tikhonova, N. A.; Nurov, A. U. (Center Oncology Res., USSR Acad. Medical Sciences, Moscow, USSR). *Vopr. Onkol.* 23(5):54-59; 1977.

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0472 RADIOTHERAPY OF EPIDERMOID CANCER OF THE RECTUM. (Rus.) Khrushchov, M. M.; Simakina, E. P.; Raifel, B. A. (Center Oncology Res., USSR Acad. Medical Sciences, Moscow, USSR). *Med. Radiol. (Mosk.)* 22(8):19-25; 1977.

0473 A CASE OF COLONIC POLYPOSIS. (Pol.) Letachowicz, E.; Jaworski, R.; Martin, A.; Widera, H. (Krucza 71 m. 4, 53-405 Wroclaw, Poland). *Wiad. Lek.* 30(12):979-980; 1977.

0474 PERICECAL HERNIA. (Pol.) Bukowski, J. (Sniadeckich 27 m. 21, 25-366 Kielce, Poland). *Pol. Przegl. Chir.* 49(6):629-631; 1977.

0475 ACUTE NECROSIS OF THE COLON WITHOUT VASCULAR OBSTRUCTION: REPORT OF SIX NEW CASES. (Fre.) Seror, J.; Mathieu, P.; Sava, G.; Schmitt, J. C.; Thomas, M. (Service de Chirurgie Generale II, C.H.U., 67000 Strasbourg, France). *Chirurgie* 103(6):440-451; 1977.

0476 SEVERE COMPLICATIONS OF APPENDECTOMY: REPORT OF 11 CASES. SURGICAL AND NUTRITIONAL PROBLEMS. (Fre.) Gouzi, J. L.; Gouzi, M.;

Barret, A.; Vaysse, C.; Mason, J.; Gedeon, A. (Clinique Chirurgicale C, Toulouse, France). *Chirurgie* 103(6):430-439; 1977.

0477 THE POSTOPERATIVE MANAGEMENT OF GASTROINTESTINAL FISTULA BY PARENTERAL LONG-TERM HYPERALIMENTATION. (Ger.) Peitsch, W.; Becker, H. D.; Burkhardt, K. (Klinik und Poliklinik fur Allgemeinchirurgie der Universitat Gottingen, Gosslerstrasse 10, D-3400 Gottingen, W. Germany). *Chirurg* 48(6):403-406; 1977.

0478 MODIFICATION OF RECONSTRUCTIVE OPERATIONS FOR MEGACOLON IN CHILDREN. (Rus.) Topuzov, V. S. (Kharkov Medical Inst., Kharkov, USSR). *Klin. Khir.* (6):54-58; 1977.

0479 ANALYSIS OF 175 OPERATIONS FOR HIRSCHSPRUNG'S DISEASE IN CHILDREN. (Rus.) Sitkovsky, N. B.; Baklanova, A. N. (Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (6):6-9; 1977.

0480 GENERALIZED FECAL PERITONITIS: ETIOPATHOGENIC AND THERAPEUTIC CONSIDERATIONS IN 30 CASES. (Fre.) Hollender, L. F.; Meyer, Ch.; Calderoli, H.; Zavaletta, D. (Service de Chirurgie Generale 3, C.H.U., 1, place de l'Hopital, 67005 Strasbourg Cedex, France). *J. Chir. (Paris)* 113(4): 327-336; 1977.

0481 FAMILIAL COLONIC POLYPOSIS. (Fre.) Granges, Y.; Montant, A.; Megevand, R. (Clinique Sainte-Claire, 3960 Sierre, Switzerland). *J. Chir. (Paris)* 113(4):395-404; 1977.

0482 PROBLEMS RAISED BY THE PREVENTION AND DETECTION OF COLONIC AND RECTAL CARCINOMA. (Fre.) Frexinos, J.; Escourrou, J.; Joffre, F.; Suduca, P.; Ribert, A. (Centre Hospitalier Universitaire de Rangueil, 31054 Toulouse Cedex, France). *Sem. Hop. Paris* 53(24):1462-1468; 1977.

0483 CECOSTOMY AND LEFT COLECTOMY. (Fre.) Pouyet, M.; Perrin, J. P.; Treboux, M. (Clinique Claude Bernard, 69600 Ouillins, France). *Lyon Chir.* 73(3):206-208; 1977.

0484 INVASION OF THE DUODENAL WALL BY CARCINOMA OF THE RIGHT COLON. (Fre.) Guillemin, G.; Braillon, G.; Rivier, R.; Bigay, D. (Clinique Chirurgicale C, Hotel-Dieu, 69288 Lyon Cedex 2, France). *Lyon Chir.* 73(2):106-110; 1977.

0485 PROFUSE COLONIC HEMORRHAGE DUE TO DIVERTICULOSIS: ROLE OF ARTERIOGRAPHY. (Fre.) Marre, Ph.; Paillot, J.; de Hochepied, F.; Alexandre, J. H. (Hopital Broussais, 96, rue Didot, 75014 Paris, France). *Ann. Chir.* 31(6):505-510; 1977.

0486 A RARE CASE OF ACUTE BLEEDING FROM A STRESS COLON: ETIOLOGY, PATHOGENESIS, AND TREATMENT. (Fre.) Mercati, U.; Vecchiarelli, G.; Berardi, F.; Natalini, G. (Hopital Regional, Perouse, Ombrie, Italy). *J. Chir. (Paris)* 113 (5/6):531-536; 1977.

See also, 0010, 0012, 0237, 0245, 0283, 0299, 0300, 0304, 0305, 0327, 0350, 0398, 0399, 0400, 0401, 0411, 0421, 0422, 0490, 0491, 0492, 0717, 0722, 0723, 0731, 0732, 0733, 0736, 0756, 0761.

LARGE INTESTINE

Ulcerative Colitis

0487 BLOOD pH: A TEST FOR ASSESSMENT OF SEVERITY IN PROCTOCOLITIS. (Eng.) Caprilla, R.; Vernia, P.; Colanieri, O.; Torsoli, A. (Policlinico Umberto I, Rome, Italy). *Gut* 17(10):763-769; 1976.

Clinical and laboratory studies on 58 patients with active idiopathic proctocolitis (complicated by toxic megacolon in 10 cases) are reported. As the severity and extent of disease increased, arterial pH became progressively higher. In cases of mild and moderate disease, mean pH values of about 7.43 and 7.42, resp., were observed; a pH over 7.50 invariably indicated severe colitis or toxic megacolon and usually corresponded with total colitis. Various degrees of correlation were found between pH and pulse rate (r=0.6036), body temperature (r=0.4806), ESR (r=0.4826), and plasma albumin (r=0.5778). In cases of mild, moderate, severe, and complicated (toxic megacolon) disease, the maximum body temperatures were 36.6 ± 0.07, 36.8 ± 0.16, 37.3 ± 0.15, and 37.6 ± 0.35 C, resp. The maximum pulse rates for the above disease categories were 78.8 ± 2.05, 82.7 ± 2.37, 93.8 ± 3.46, and 100.0 ± 6.6/min, resp. The ESR values (1st hr) for these disease categories were 9.08 ± 1.9, 30.3 ± 9.4, 27.7 ± 6.1, and 44.7 ± 9.0 mm, resp. Serum albumin levels for the disease categories were 3.75 ± 0.11, 3.23 ± 0.10, 2.57 ± 0.15, and 2.38 ± 0.22 g/100 ml, resp. A correlation was also found between arterial pH and gas in the small and large bowel ($r=0.5652$). Intestinal gas levels in mild, moderate, severe, and complicated disease were 54.4 ± 4.81, 75.1 ± 6.93, 139.3 ± 18.5, and 339.3 ± 27.8 cm^2, resp. Blood pH measurement and plain x-ray films of the abdomen are the most reliable single methods for rapid detection of the early phases of intestinal dilatation. A progressively increasing amount of intestinal gas and a blood pH above 7.50 should be regarded as alarm signs that toxic dilatation of the colon is impending.

0488 RISK FACTORS IN ULCERATIVE COLITIS.

(Eng.) Gilat, T.; Lilos, P.; Benaroya, P.; Zemishlany, Z.; Ribak, J. (Tel Aviv Univ. Sackler Sch. Medicine, Tel Aviv, Israel). *Digestion* 14(5/6):400-408; 1976.

Risk factors were analyzed in 504 Jewish patients with ulcerative colitis (UC). The incidences of severe attacks, weight loss, iron deficiency, liver disease, and arthritis were significantly ($p<0.05$) higher in women (27.0, 33.3, 32.4, 4.9, and 7.4%, resp.) than in men (16.5, 27.3, 25.4, 1.5, 2.3%, resp.). The severity of several parameters of UC tended to be in the following order by community group: Ashkenazi>Sephardi>Oriental. Mortality ($p<0.001$), weight loss ($p=0.05$), and duodenal ulcer ($p=0.01$) were significantly higher or more frequent in patients whose disease started after age 50 yr. Severe attacks were recorded in 25.1% of cases with definite UC and in 5.5% with probable UC ($p<0.001$). In definite UC, the extent of colon affected was distal in 31.6%, substantial in 41.1%, and universal in 16.2% (uncertain in 11.1%) of the cases; the corresponding incidences of extent in probable UC were 53.1, 22.4, and 2.2% (uncertain, 22.3%), resp. ($p<0.001$). Toxic megacolon and perforation occurred more frequently with increasing disease extent, but the small numbers involved were unsuitable for statistical analysis. Colectomy and mortality were significantly ($p<0.001$) more frequent with increasing disease extent; the incidence of colectomy in universal disease cases was 20.3% versus 6.2% for all cases, and the mortality incidence in universal disease was 24.6% versus 10.7% for all cases. Incidence of severe attacks was positively related to disease extent ($p<0.001$), with the incidences for uncertain disease extent and all cases being 16.7% and 21.6%, resp. The course of the disease was correlated positively with extent of colon affected ($p<0.001$). Other positive correlations found were length of follow-up and disease extent ($p<0.001$) and length of follow-up and disease severity ($p<0.05$).

0489 ULCERATIVE COLITIS IN CHILDREN: RESULTS OF COLECTOMY IN 38 PATIENTS WITH CHILDHOOD ONSET OF DISEASE.

(Eng.) Naas, R.; Gruner, O. P. N.; Flatmark, A.; Fretheim, B.; Gjone, E. (Rikshospitalet, Oslo, Norway). *Z. Kinderchir.* 21(3):237-244; 1977.

Ulcerative colitis was studied in children (38 colectomized patients) using ileostomy (14 patients) and ileorectal anastomosis (IRA, 24 patients). A majority of the children were growth retarded at the time of operation. Only 6 of the 38 children had fulminating disease. Duration of the disease before operation was an average of 5.7 yr. The follow-up period (range 18 months-14 yr) ended at the age of 21 yr. Colectomy as late as 16 yr of age had a positive effect on stature ($p<0.01$). Cancer occurred in four IRA patients and appears to be a much greater risk in patients with childhood onset of the disease. Only 6 of the 20 survivors obtained a satisfactory bowel function. Relaparotomy was necessary in 13 of the IRA patients but in none of the ileostomy patients. Ileostomy is a safer operation than IRA and has a significantly lower frequency of complications ($p=0.005$) leading to relaparotomy. Hence, 17 of the 24 IRA patients were either dead, converted to ileostomy, or had an unsatisfactory functional result. Ileostomy function, measured as the interval between changing of the bag, was 1-7 days. Ileostomy function was better ($p=0.0004$) in young patients than in patients after puberty. All survivors except one were able to work, and six of them married. Young patients with ileostomy adapted well and were reported to have fewer problems in their daily life than patients with later onset of disease. Therefore, young age is not a contraindiaction for proctocolectomy and ileostomy.

0490 GLUCOSAMINE SYNTHETASE ACTIVITY OF THE COLONIC MUCOSA IN ULCERATIVE COLITIS AND CROHN'S DISEASE.

(Eng.) Goodman, M. J.; Kent, P. W.; Truelove, S. C. (Dept. Medicine, Univ. Chicago, IL). *Gut* 18(3):219-228; 1977.

A miniaturizing method for assay of glucosamine synthetase (GS), requiring just over 4 mg of tissue obtained by rectal biopsies, is described. The study was undertaken to identify differences in GS levels between ulcerative colitis (UC) and Crohn's disease (CD). The mean levels of GS in normal human colonic mucosa (25 colectomy specimens and 20 rectal biopsies) were 13.77 ± 3.97 μmol glucosamine synthesized/hr/g wet weight. There was a lower mean of GS levels in the colectomy specimens from patients with UC and CD, which was related to diminution in the epithelial cell density. However, in samples of mucosa in which the epithelial cells were absent, the GS levels were 3.0 ± 0.9 μmol/hr/g. GS levels were normal when there was loss of goblet cells only. In 15 of the 20 patients recovering from an acute attack of UC, the GS level rose to a peak above the normal range (mean peak level 23.94 μmol/hr/g) followed by a fall to within normal range. This effect did not occur in five patients who did not make prompt recovery. The GS levels in 13 biopsies from patients with CD sparing rectum had a mean of 20.55 μmol/hr/g, considerably higher than that of the normal range ($p<0.001$). The peak effect in UC appears to be a manifestation of recovery and probably is related to the synthesis of gastrointestinal mucus or immunoglobulin or the secretory component of IgA, all of which contain large amounts of *N*-acetyl-glucosamine.

0491 THE RADIOLOGICAL INVESTIGATION OF COLONIC EPITHELIAL DYSPLASIA AND LATENT CARCINOMA IN CHRONIC ULCERATIVE COLITIS--PRELIMINARY OBSERVATIONS [Abstract]. (Eng.) Frank, P. H.; Riddell, R. H.; Levin, B.; Feczko, P. J. (Dept. Radiology, Univ. Chicago, Chicago, IL). *Clin. Res.* 25(4): 607A; 1977.

0492 SURVEY OF PROTEIN NUTRITION IN INFLAMMATORY BOWEL DISEASE--A RATIONAL BASIS FOR NUTRITIONAL THERAPY [Abstract]. (Eng.) Pickford, I.; Hill, G. L.; Blackett, R. L.; Bradley, J. A. (General Infirmary, Leeds, England). *Gut* 18(11):A970; 1977.

0493 DIRECT METHOD OF MEASURING FAECAL PROTEIN LOSS IN PATIENTS WITH ULCERATIVE COLITIS [Abstract]. (Eng.) Buckell, N. A.; Gould, S. R.; Hernandez, M. A.; Kohn, J.; Lennard-Jones, J. E.; Powell-Tuck, J.; *et al.* (St. Mark's Hosp., London, England). *Gut* 18(11):A971; 1977.

0494 FURTHER STUDIES OF SALICYLAZOSULPHAPYRIDINE METABOLISM IN THE TREATMENT OF ULCERATIVE COLITIS [Abstract]. (Eng.) Cowan, G. O.; Das, K. M.; Eastwood, M. A. (Western General Hosp., Edinburgh, Scotland). *Gut* 18(11):A972; 1977.

0495 CONTROLLED COMPARISON OF SODIUM CROMOGLYCATE AND SULPHASALAZINE IN THE MAINTENANCE OF REMISSION IN ULCERATIVE COLITIS [Abstract]. (Eng.) Dronfield, M. W.; Langman, M. J. S. (City Hosp., Nottingham, England). *Gut* 18(11):A973; 1977.

0496 ENDOCARDITIS COMPLICATING ULCERATIVE COLITIS [Letter to Editor]. (Eng.) Ward, R. L. (Royal Infirmary, Blackburn, Lancaster BB2 3LR, England). *Gastroenterology* 73(5):1189-1190; 1977.

0497 HISTOPATHOLOGICAL OBSERVATIONS IN RECTAL BIOPSIES OF CHILDREN WITH ULCERATIVE COLITIS [Abstract]. (Eng.) Guastavino, E.; Costa, J. A.; Ortiz, J.; Toccalino, H. (No affiliation given). *Arq. Gastroenterol.* 14(3):159; 1977.

0498 COLOSCOPY--ITS VALUE IN DIAGNOSING ULCERATIVE COLITIS AND CROHN'S DISEASE [Abstract]. (Eng.) Weingart, J.; Fischer, L.; Kahl, D.; Ottenjann, R. (Stadt. Krankenhauses Munchen-Neuperlach, Munchen, W. Germany). *Endoscopy* 9(3):194; 1977.

0499 THERAPY OF ULCERATIVE COLITIS. (Ita.) Palmas, S. (Primario II Divisione di Medicina, OO.RR. Sassari, Italy). *Clin. Ter.* 81(5):463-479; 1977.

0500 THE NATURE OF ENDOALLERGY IN CHILDREN WITH NONSPECIFIC ULCERATIVE COLITIS. (Rus.) Kanshina, O. A.; Artemkin, V. D.; Kanshin, N. N. (Moscow Scientific Res. Inst. Epidemiology and Microbiology, Moscow, USSR). *Sov. Med.* (5):36-40; 1977.

0501 EFFICIENCY OF INTRAPORTAL TRANSFUSION THERAPY OF PATIENTS WITH SEVERE UNSPECIFIC ULCERATIVE COLITIS. (Rus.) Novikova, R. I.; Zavgorodny, L. G.; Pedenko, V. P. (Donetsk Medical Inst., Donetsk, USSR). *Klin. Khir.* (8):82-84; 1977.

0502 THE TREATMENT OF ACUTE ATTACKS OF ULCERATIVE COLITIS. (Spa.) Herrerias, J. M.; Perez Ruilopez, M. A.; Pellicer Bautista, F. J.; Garrido Peralta, M. (Hospital Universitario de Sevilla, Seville, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(5):541-548; 1977.

0503 ULCERATIVE COLITIS AND PREGNANCY. (Cze.) Bitter, J. (I. interni oddeleni krajske nemocnice, 400 01 Usti nad labem, Czechoslovakia). *Cas. Lek. Cesk.* 115(37):1133-1135; 1976.

See also, 0234, 0285, 0419, 0444, 0459, 0711, 0760, 0767, 0773.

PANCREAS

0504 CHYMOTRYPSIN OUTPUT IN THE STOOLS IN PANCREATIC AND OTHER DISEASES. (Eng.) Gilat, T.; Gelman-Malachi, E.; Ronen, O. (Ichilov Hosp., Weizman St., Tel Aviv, Israel). *Am. J. Gastroenterol.* 66(2):140-145; 1976.

The value of a method in which chymotrypsin output in the stools is calculated from analysis of single stool samples, using cuprous isothiocyanate as a continuous marker, was assessed in 16 patients with and 45 patients without pancreatic disease. The calculated values agreed favorably with those from 3-day stool collections. In 45 controls, with and without steatorrhea, the chymotrypsin output was above 10,000 U/24 hr. In six patients with pancreatic insufficiency, the values were considerably lower; all were below 4,000 U/24 hr. In 10 patients with pancreatic disease without insufficiency, the values were in the normal range (>10,000 U/24 hr). This method appears to be very useful in the diagnosis of pancreatic insufficiency, but it is not sensitive enough to detect lesser degrees of pancreatic damage.

0505 PHARMACOLOGICAL INHIBITION OF DIGESTIVE SECRETIONS IN THE MANAGEMENT OF PANCREATICODUODENAL FISTULAS. (Eng.) Weisz, G. M.; Schramek, A.; Barzilai, A. (Aba Khoushy Sch. Medicine, Technion Israel Inst. Technology, Haifa, Israel). *Int. Surg.* 61(5):279-282; 1976.

0506 ENDOSCOPIC RETROGRADE PANCREATICOGRAPHY AND EXOCRINE PANCREATIC FUNCTION TEST. A COMPARATIVE STUDY [Abstract]. (Eng.) Rolny, P.; Lukes, P.; Gamklou, R.; Nilsson, A. (Sahlgrenska sjukhuset, Univ. Goteborg, Goteborg, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):82; 1977.

0507 NONPANCREATIC TYPE HYPERAMYLASEMIA ASSOCIATED WITH PANCREATIC CANCER. (Eng.) Shimamura, J.; Fridhandler, L.; Berk, J. E. (Dept. Medicine, Univ. California, Irvine, CA). *Am. J. Dig. Dis.* 21(4):340-345; 1976.

0508 ALPHA$_1$ ANTITRYPSIN DEFICIENCY AND PANCREATIC FIBROSIS. (Eng.) Freeman, H. J.; Weinstein, W. M.; Shnitka, T. K.; *et al.* (Dept. Medicine, Univ. Alberta, Edmonton, Canada). *Ann. Intern. Med.* 85(1):73-76; 1976.

0509 10 YEARS' EXPERIENCE TREATING PANCREATIC AND PERIAMPULLARY CANCER. (Eng.) Hines, L. H.; Burns, R. P. (No affiliation given). *Am. Surg.* 42(6):441-447; 1976.

0510 PHYSIOPATHOLOGIC STUDY OF THE ZOLLINGER ELLISON SYNDROME. (Fre.) Gorin, J. P. (37 Ave. Lowendal, Paris, France). *J. Chir. (Paris)* 111(1):75-98; 1976.

0511 SELECTIVE CATHETERIZATION OF THE PANCREATIC VEIN FOR RADIOIMMUNOASSAY IN GLUCAGON SECRETING CARCINOMA OF THE PANCREAS. (Eng.) Ingemansson, S.; Lunderquist, A.; Holst, J. (Dept. Surgery, Univ. Lund, Lund, Sweden). *Radiology* 119(3):555-556; 1976.

0512 ELEVATED SERUM RIBONUCLEASE IN PATIENTS WITH PANCREATIC CANCER. (Eng.) Reddi, K. K.; Holland, J. F. (Mt. Sinai Sch. Medicine, New York, NY 10029). *Proc. Natl. Acad. Sci. U.S.A.* 73(7):2308-2310; 1976.

0513 MISLEADING SGOT (ASPARTATE AMINOTRANSFERASE VALUES IN OBSTRUCTIVE JAUNDICE DUE TO PANCREATIC CARCINOMA). (Eng.) Gregory, P. B.; Cooney, D. P. (Stanford Sch. Medicine, Stanford, CA 94305). *Am. J. Dig. Dis.* 21(6):509-511; 1976.

0514 COMPUTERIZED AXIAL TOMOGRAPHY FOR DIAGNOSIS OF PANCREATIC CANCER. (Eng.) Wiggans, G.; Schein, P. S.; MacDonald, J. S.; *et al.* (Vincent Lombardi Cancer Res. Center, Washington, DC 20007). *Lancet* 2(7979):233-235; 1976.

See also, 0009, 0126, 0274, 0283, 0389, 0527, 0709.

PANCREAS

Pancreatitis

0515 A NEW PATTERN OF PANCREATIC SECRETION (PBS) OBSERVED IN PANCREATIC EDEMA. (Eng.) Tuzhilin, S. A.; Dreiling, D. A. (Mt. Sinai Medical Sch., City Univ. New York, 100th St. and Fifth Ave., New York, NY 10029). *Am. J. Gastroenterol.* 67(3):220-228; 1977.

Exocrine pancreatic secretion studies were done on 53 patients with pancreatic edema and 3 Thomas cannula dogs to elucidate the pathogenesis of proximal block of pancreatic secretion (P.B.S.). Pancreatic secretion was investigated using secretin and intraduodenal HCl as stimuli. An abnormal pattern of secretion following HCl administration in pancreatic edema patients (20) was observed: there was a significant decrease in flow ($p<0.001$), decreased bicarbonate concentration ($p<0.05$ after 20- to 40-min stimulation), and increased amylase concentration ($p<0.01-0.05$). Reversal of the secretory pattern after i.v. secretin administration (1 clinical U/kg) towards normal for flow and bicarbonate concentration was seen, though the hyperconcentration of the enzyme ($p<0.01-0.001$) compared to the normal patients (13) persisted. Comparison of the weak HCl and strong secretin stimulus to pancreatic secretion in the pancreatic edema patients augmented the abnormal discordant secretory defect (diminuition in flow, $p<0.001$); there was an insignificant effect on bicarbonate concentration and an insignificant increase in amylase concentration. This reversal of the secretory pattern of P.B.S. is due to a larger secretory flow nullifying the dilution effect of interstitial fluid exudation into the duct system. Dehydration with diuretics in pancreatic edema patients (14) reversed the secretory abnormality (P.B.S.). Secretin test response in dogs before and after adrenalin infusion (0.1-1%) showed decreased flow (p<0.001->0.10) and increased enzyme concentration (p<0.01). The combined low stimulus-high stimulus approach is suggested to study pancreatic damage or dysfunction.

0516 ENDOSCOPIC RETROGRADE PANCREATOGRAPHY AND SECRETIN-PANCREOZYMIN TEST IN DIAGNOSIS OF CHRONIC PANCREATITIS: A COMPARATIVE EVALUATION.

(Eng.) Dobrilla, G.; Fratton, A.; Valentini, M.; Vantini, I.; Cavallini, G.; Angelini, G.; *et al.* (Ospedale Generale Regionale, I-39100 Bolzano, Italy). *Endoscopy* 8(3):118-123; 1976.

The diagnostic values of endoscopic retrograde pancreatography (ERP) and secretin-pancreozymin (S-CCK.PZ) test were compared in 23 patients, 6 with suspected chronic pancreatitis and 17 with proven chronic pancreatitis. The results showed a good correlation between ERP examinations and S-CCK.PZ test only for patients with proven chronic pancreatitis. In patients with suspected chronic pancreatitis, there were discrepancies between ERP (normal results) and S-CCK.PZ test (abnormal for the only parameter "low flow"). The principal types of ERP abnormality were alternate dilatation and stenosis of Wirsung's duct (75%), cystic dilatation of branches (58%), irregular distribution of the branches (41%), and calculi in Wirsung's duct (34%). The time of elimination of the contrast medium was significantly correlated with the S-CCK.PZ test and with the pancreatographic picture.

0517 ULTRASOUND IN THE MANAGEMENT OF ACUTE PANCREATITIS.

(Eng.) Duncan, J. G.; Imrie, C. W.; Blumgart, L. H. (Royal Infirmary, Glasgow, G40SF, Scotland). *Br. J. Radiol.* 49(586):858-862; 1976.

Following a proven attack of acute pancreatitis, 38 patients were referred for ultrasound examination when signs or symptoms suggested the development of a pancreatic pseudocyst. Pseudocysts were diagnosed by ultrasound in 23 cases (12 related to alcohol, 6 to biliary disease, 2 to trauma, and 3 to other causes). Five patients had multilocular cysts, four of which were shown by ultrasound to be communicating. Pseudocyst was confirmed in 13 of 14 patients undergoing laparotomy, and surgical drainage was performed in 12 of these patients. Three patients had small cysts (less than 6 cm in diameter) in the head of the pancreas; two were proven at laparotomy and were successfully treated by surgical drainage. The remaining nine cases (8 single cysts and 1 multiple cyst) were monitored over periods of 4-12 weeks and showed spontaneous regression. An area of irregular absorption of ultrasound in 12 additional patients among the 38 examined was interpreted as an inflammatory mass that was confirmed in all 3 cases requiring laparotomy. Serial scanning of these 12 patients showed resolution of the mass over periods of 4-20 weeks. None of these cases developed a pseudocyst, but three required operation, one for an abscess, one for necrosis of the body and tail of the pancreas, and a third for severe pancreatic fibrosis. Three of the 38 patients examined showed no ultrasound evidence of inflammatory mass or cyst, and these 3 improved spontaneously without surgery. Ultrasonic scanning is a useful noninvasive means for distinguishing between pseudocysts and inflammatory masses and for demonstrating communication between multiple cysts.

0518 CALCIFIC PANCREATITIS AND IMMUNOLOGY.

(Ger.) Klemm, G.; Rohde, L. (Abteilung fur Poliklinische Diagnostik, Wilhelm-Pieck-Universitat Rostock, Ernst-Heydemann-Str., DDR-25 Rostock, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(2):73-75; 1976.

No change in plasma amylase levels was noted in 24 rats with chronic interstitial calcifying pancreatitis induced by vitamin D_2 (1 mg/100 g, s.c.) and iron dextran (0.3 ml in the pancreatic stroma). Eight animals died of calcifying pancreatitis within 3 months, and body weight decreased on the average by one-third during the first test week. Histologically, chronic granulating inflammation with foreign giant cells as well as pseudoductular parenchyma regeneration were found in the interstitial calcification. Other test results have shown that not only a macromolecule, such as iron dextran, but also isolated rat peritoneal mast cells with IgE can cause degranulation. In calcifying pancreatitis, a mast cell reaction induced by an immune mechanism reaction may be possible.

0519 STUDIES ON SERUM AMYLASE IN NORMAL MAN AND IN ACUTE PANCREATITIS.

(Eng.) MacGregor, I. L.; Zakim, D. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Aust. N.Z. J. Med.* 6(6):551-556; 1976.

To assess the potential significance of amylase isoenzymes in the diagnosis of pancreatic disease, amylase isoenzyme patterns were determined in human serum, urine, saliva, jejunal juice, and pancreatic tissue. The isoenzymes were separated by isoelectric focusing. The predominant amylase isoenzyme fraction in 11 of 14 samples of autopsy pancreases focused with an isoelectric point between 6.8 and 7.1. The crude homogenate of all such glands that were tested had the ability to hydrolyze *p*-tosyl arginine methyl ester hydrochloride (TAME). TAME esterase activity was not detectable in the crude homogenates of three pancreases with isoamylases focusing with isoelectric points between 6.2 and 6.3, although a number of glands without detectable TAME esterase activity contained isoamylases focusing predominantly at pH 6.8 to 7.1. The amylase isoenzymes in freshly expectorated saliva showed two major isoenzyme peaks with isoelectric points between 5.8 to 6.0, and 6.3 to 6.4. Amylase isoenzymes in aspirates from the small intestine demonstrated isoenzymes derived from the pancreas and salivary glands. The pattern of isoenzymes of amylase in the sera of normal subjects revealed fractions likely to be derived from the salivary glands and the pancreas. In the majority of sera, the major amylase isoenzyme had an isoelectric point between 5.8 and 6.0. This peak coincided with the major peak from saliva, and was therefore of salivary gland origin. The pattern of isoenzymes in sera and urine from patients with acute pancreatitis differed quantitatively from that in normal subjects. The predominant peak of amylase activity in acute pancreatitis sera had an isoelectric point of 6.8 to 7.1. The activity of the amylase isoenzymes of presumed salivary origin was also increased. The mean renal clearance of amylase as the percentage of creatinine clearance in four patients with acute pancreatitis was 4.7 ± 1.2. The clearance of the pancreatic peak with an isoelectric point of 6.8 to 7.0 was 7.1 ± 3.5%, and the clearance of the salivary peak with an isoelectric point between 5.8 and 6.0 was 3.0 ± 1.1%. The increased renal clearance of amylase in acute pancreatitis may be due partly to the increased proportion of the smaller molecular weight pancreatic amylase. However, the increase in the renal clearance of salivary amylase suggests that the kidneys are also involved. These studies also indicate that the majority of amylase activity in normal sera is of salivary gland origin.

0520 POSSIBLE MECHANISMS OF NORMAL AMYLASE ACTIVITY IN HYPERLIPEMIC PANCREATITIS. (Eng.) Mishkin, S.; Bates, J.; O'Hashi, J.; Schneider, P.; Sniderman, A. D.; Wolf, R. O. (Royal Victoria Hosp., 687 Pine Ave. W, Montreal, Quebec H3A 1A1, Canada). *Can. Med. Assoc. J.* 115(10): 1016-1019; 1976.

Possible mechanisms of normal amylase activity in patients with hyperlipemic pancreatitis were investigated. When lipemic serum from three patients with acute pancreatitis and type IV hyperlipemia was fractionated into very-low-density lipoproteins (VLDL) and clear serum amylase activities (determined by the Phadebas method) in the VLDL fractions (20, 40, and 384 IU/l, resp.) and clear serum fractions (67, 157, and 525 IU/l, resp.) never exceeded the amylase activities in the original lipemic sera (165, 490, and 1,875 IU/l, resp.). This fact indicates that the removal of lipid turbidity from the original lipemic sera did not unmask high levels of amylase activity in the remaining clear serum. The addition of the VLDL and clear serum fractions or the addition of VLDL and chylomicrons from asymptomatic patients with hyperlipemia to nonlipemic serum from three patients with routine acute pancreatitis and high serum amylase activities (1000-6,000 IU/l) did not inhibit the amylase activities or alter the electrophoretic mobility of amylase isoenzymes. Therefore, the normal amylase activity often observed in hyperlipemic pancreatitis does not result from an inhibition of amylase activity by serum lipoproteins.

0521 POST-TRANSPLANTATION PANCREATITIS. (Eng.) Fernandez, J. A.: Rosenberg, J. C. (Dept. Surgery, Wayne State Univ., Detroit, MI). *Surg. Gynecol. Obstet.* 143(5):795-798; 1976.

A review of the literature on postrenal transplantation pancreatitis is presented along with case reports of two women developing this condition. Post-transplantation pancreatitis occurs with a frequency of about 3% and carries a mortality of 70%. An average of 216 days (range, 1-570 days) following transplantation elapses before the onset of pancreatitis, which occurs most frequently in men in the fourth decade of life. Post-transplantation pancreatitis was unsuspected in 35% of patients with this condition who died and were autopsied. Factors that predispose to pancreatitis in the post-transplant period include immunosuppressive therapy with azathioprine and steroids, secondary hyperparathyroidism, and increased susceptibility to infection. The diagnosis of pancreatitis depends greatly on an increase in the serum amylase level, which had been found to vary from 2 to 40 times the normal value in post-transplant patients with pancreatitis. In one of the two cases reported, the serum amylase level was 340 U/100 ml 3 months post-transplant, and a serum amylase level as high as 1,600 U/100 ml was recorded in the other patient 3.5 months after renal transplantation. After renal transplantation, patients should frequently have serum and urinary amylase determinations, with these determinations being compared to the creatinine clearance rates. The diagnosis of pancreatitis should be considered if any abdominal symptoms occur. It is possible that post-transplant pancreatitis is caused by a virus and is related to the immunosuppressive state. The presence of cytomegalovirus in the pancreas has been reported, but its pathogenetic significance is uncertain.

0522 COMPLEMENT MEDIATED ACINAR CELL NECROSIS IN PANCREATITIS INDUCED BY BASEMENT MEMBRANE ANTIBODIES. (Eng.) Seelig, R.; Seelig, H. P. (Inst. Pathology, Univ. Heidelberg, Heidelberg, W. Germany). *Virchows Arch.* [*Pathol. Anat.*] 371(1): 69-77; 1976.

0523 ACUTE PANCREATITIS IN TWO CASES OF INFECTIOUS MONONUCLEOSIS. (Eng.) Hedstrom, S. A.; Belfrage, L. (Univ. Hosp., Lund, Sweden). *Scand. J. Infect. Dis.* 8(2):124-126; 1976.

0524 BISALBUMINEMIA IN PANCREATITIS: STRUCTURAL MODIFICATIONS OF HUMAN SERUM ALBUMIN BY PROTEOLYTIC ENZYMES OF THE PANCREAS. (Fre.) Rousseaux, J.; Debeaumont, D.; Scharfman, A.; *et al.* (Fac. Med., Lille, France). *Clin. Chim. Acta* 71(1): 35-46; 1976.

0525 SEQUESTRECTOMY AND HYPERALIMENTATION IN THE TREATMENT OF HEMORRHAGIC PANCREATITIS. (Eng.) White, T. T.; Heimbach, D. M. (Univ. Washington Sch. Medicine, Seattle, WA 98195). *Am. J. Surg.* 132(2):270-275; 1976.

0526 THE VALUE OF ALKALINE PHOSPHATASE (AP) AS A MARKER FOR COMMON BILE DUCT (CBD) STENOSIS IN ALCOHOLIC PANCREATITIS. (Eng.) Littenberg, G.; Afroudakis, A.; Kaplowitz, N. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA). *Gastroenterology* 73(5):1232; 1977.

0527 PAROTID GLAND FUNCTION IN PATIENTS WITH PANCREATIC DISEASE [Abstract]. (Eng.) McColl, K. E. L.; Brodie, M. J.; White-Smith, R.; Thomson, T. J. (Stobhill Hosp., Glasgow, Scotland). *Gut* 18(11):A960; 1977.

0528 SINGLE CENTRE DOUBLE-BLIND TRIAL OF TRASYLOL THERAPY IN PRIMARY ACUTE PANCREATITIS [Abstract]. (Eng.) Imrie, C. W.; Benjamin, I. S.; Ferguson, J. C.; Thomson, W. O.; McKay, A. J.; O'Neil, J.; Blumgart, L. H. (Royal Infirmary, Glasgow, Scotland). *Gut* 18(11):A957-A958; 1977.

0529 VALUE OF DIAGNOSTIC PERITONEAL LAVAGE TO DETERMINE THE SEVERITY OF ACUTE PANCREATITIS [Abstract]. (Eng.) McMahon, M. J.; Blackett, R. L.; Pickford, I. (General Infirmary, Leeds, England). *Gut* 18(11):A958; 1977.

0530 ERCP AND SURGERY IN RECURRENT ACUTE PANCREATITIS [Abstract]. (Eng.) Cotton, P. B.; Croker, J. R. (Middlesex Hosp., London, England). *Gut* 18(11):A941; 1977.

0531 GIP CELLS IN CHRONIC PANCREATITIS [Abstract]. (Eng.) Buchan, A. M. J.; Polak, J. M.; Bloom, S. R.; Besterman, H.; South, M.; McCloy, J. H.; *et al.* (Royal Postgraduate Medical Sch., London, England). *Gut* 18(11):A983; 1977.

0532 Mycoplasma pneumoniae--AN AETIOLOGICAL FACTOR IN ACUTE PANCREATITIS [Abstract]? (Eng.) Freeman, R.; McMahon, M. J. (Chapel Allerton Hosp., Leeds, England). *Gut* 18(11):A981; 1977.

0533 PAIRED PANCREATIC FUNCTION STUDIES USING PURE PANCREATIC JUICE AND DUODENAL JUICE [Abstract]. (Eng.) Denyer, M. E.; Cotton, P. B.; Kyne, M.; Miller, A. (Middlesex Hosp. and Medical Sch., London, England). *Gut* 18(11):A980; 1977.

See also, 0119, 0121, 0127, 0260, 0504, 0512, 0652.

LIVER AND BILIARY TRACT

0534 LAPAROSCOPY WITH PARTICULAR REFERENCE TO MANAGEMENT OF DISEASES OF THE LIVER. (Eng.) Walker, R. J.; Williams, R. *In: Modern Topics in Gastrointestinal Endoscopy*. Edited by K. F. Schiller, and P. R. Salmon. (Chicago: William Heinemann Medical Books): 275-295; 1976.

In this review, laparoscopy is discussed in terms of equipment, technique, indications for use, results, and complications. The normal and pathological appearance of abdominal organs observed by laparoscopy is described. Biopsy is considered to be an essential part of the technique and should be performed, if possible, to confirm laparoscopic findings. The most common indications for the procedure are hepatomegaly, unexplained liver function test abnormalities, suspected cirrhosis or tumor, jaundice, and ascites. The correct diagnosis was made by laparoscopy in 75 of 100 consecutive patients examined for the aforementioned indications. Five case histories are presented to illustrate typical diagnostic situations in which laparoscopy proved to be valuable.

0535 DISPOSITION OF AMINOPYRINE, ANTIPYRINE, DIAZEPAM, AND INDOCYANINE GREEN IN PATIENTS WITH LIVER DISEASE OR ON ANTICONVULSANT DRUG THERAPY: DIAZEPAM BREATH TEST AND CORRELATIONS IN DRUG ELIMINATION. (Eng.) Hepner, G. W.; Vesell, E. S.; Lipton, A.; Harvey, H. A.; Wilkinson, G. R.; Schenker, S. (Harbor General Hosp., Torrance, CA 90509). *J. Lab. Clin. Med.* 90(3):440-456; 1977.

The extent of hepatic elimination of various drugs was compared in controls, patients receiving anticonvulsants that stimulate the microsomal oxidizing system, and patients with hepatobiliary diseases (hepatocellular disease, hepatic neoplasm, or cholestasis). Aminopyrine metabolism was measured by the aminopyrine breath test, diazepam elimination by a newly developed ^{14}C-diazepam breath test (DBT) and by conventional plasma diazepam measurements, antipyrine clearance by drug analysis in saliva, and indocyanine green (ICG) clearance by its removal rate from plasma. The DBT correlated well with diazepam half-life when all subject groups were combined ($r=-0.65$, $p<0.001$). Anticonvulsant drugs enhanced the elimination of aminopyrine, diazepam, and antipyrine, but the degree of stimulation was significantly lower for aminopyrine; ICG elimination was not altered by anticonvulsant drugs. The mean elimination for each drug tested in patients with hepatocellular and neoplastic liver diseases was depressed significantly and to a similar extent. In cholestasis, elimination of antipyrine and ICG but not of aminopyrine or diazepam was depressed significantly. Finally, there was no consistent correlation of the elimination of the four drugs tested in controls alone, and the correlation, although sometimes statistically significant, was only marginal (r=0.30-0.67) in the combined hepatobiliary group alone. Attempts to extrapolate pharmacokinetic data from one drug to another in individual subjects may be misleading.

0536 GROWTH HORMONE AND PROLACTIN RESPONSES TO THYROTROPIN-RELEASING HORMONE IN PATIENTS WITH SEVERE LIVER DISEASE.

(Eng.) Panerai, A. E.; Salerno, F.; Manneschi, M.; Cocchi, D.; Muller, E. E. (Dept. Pharmacology, Univ. Milan, Milan 20129, Italy). *J. Clin. Endocrinol. Metab.* 45(1):134-140; 1977.

To determine whether abnormalities in growth hormone release (GH) in severe liver diseases are related to a positive GH response to thyrotropin-1 releasing hormone (TRH, 400 μg) was administered i.v. to 10 patients with severe liver disease and to 10 controls. TRH induced a clear-cut GH rise (≥10 ng/ml) in seven patients; this occurred 15-120 min after the injection. TRH had no effect on GH levels in controls. The mean baseline GH levels were higher in patients than in controls (3.8 ± 1.0 versus 0.8 ± 0.4 ng/ml, p<0.02). An exaggerated and sustained increase in prolactin (PRL) was present after TRH in the subjects with liver disease, whose mean baseline plasma PRL levels were within the normal range. Although the rise in GH induced by TRH may be due primarily to a disturbance in the neuroendocrine control of GH secretion, the exaggerated PRL rise after the tripeptide seems to be caused by peripheral factors.

0537 METHODS FOR DETECTION OF ANTI-ALBUMIN AUTOANTIBODIES IN HEPATIC DISEASES.

(Eng.) Lenkei, R.; Ghetie, V. (Dept. Immunology, Babes Inst., Bucharest 6, 76, 210, Rumania). *J. Immunol. Methods* 16(1):23-30; 1977.

The application of three methods for the detection and quantitation of anti-albumin autoantibodies (AAA) in human sera is described. The methods are based on their reaction with a new antigenic site of glutaraldehyde-polymerized human serum albumin (HSA). The first method is a double diffusion technique (ID-HSA) where the sera to be tested are reacted with a copolymer of glutaraldehyde activated HSA (copoly-HSA). The reaction is estimated by the lowest copoly-HSA concentration giving precipitation with the undiluted sera. The second method is based on agglutination (HA) by AAA-positive sera of human RBC coated with glutaraldehyde-polymerized HSA (EPA). The reaction is quantified as the highest dilution of sera giving agglutination. The third method uses glutaraldehyde-insolubilized HSA as an immunoabsorbent able to bind AAA in positive sera. The quantity of protein absorbed, expressed in μg antibody/ml serum, measures the level of AAA in sera. Glutaraldehyde treatment of HSA led to the formation of soluble polymers that were able to react strongly in immunodiffusion with patients' reference sera. The HSA polymers responsible for this reaction could be prepared in high yield; more than 85% of the treated HSA was polymerized. At pH 9.0, glutaraldehyde-activated HSA bound a further amount of nontreated HSA yielding copoly-HSA. The correlation between the immunodiffusion test with animal sera (ID-AS) and ID-HSA was investigated in sera from 86 patients with acute viral hepatitis, 97 blood donors, and 84 contacts for hepatitis B surface antigen. Agreement between results occurred in 89.6% of the sera from the hepatitis patients, 84.2% of the sera from blood donors, and 91.3% of the sera of the hepatitis contacts. HA-EPA tests in the sera of healthy donors and patients with liver diseases showed that titers up to 1:32 did not indicate liver dysfunction. Titers of 1:64 to 1:4,096 were recorded in the sera of patients with liver disease and were significantly correlated with positive ID-HSA tests in viral hepatitis and in HBsAg contacts. The immunoabsorbent technique permitted the estimation of AAA concentrations in normal and pathological sera. Generally, a lack of reaction with copoly-HSA in immunodiffusion was associated with an AAA concentration below 100 μg/ml, while higher concentrations of AAA (>200 μg/ml) were associated with precipitation of copoly-HSA at 39-625 μg/ml. Highly significant correlation coefficients were calculated between the immunoabsorbent technique, ID-HSA, and HA-EPA techniques.

0538 SERUM IMMUNOGLOBULINS AND ORGAN NON-SPECIFIC ANTIBODIES IN DISEASES OF THE LIVER.

(Eng.) Husby, G.; Skrede, S.; Blomhoff, J. P.; Jacobsen, C. D.; Berg, K.; Gjone, E. (Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(3):297-304; 1977.

Serum immunoglobulins and complement fraction 3 (C3) levels, rheumatoid factors (RF), hepatitis B surface antigen (HB antigen) and antibody (HB antibody), and auto-antibodies to smooth muscle (SMA), mitochondria (MA), and nuclei (ANA) were determined in 202 patients with one of nine liver diseases. Hypergammaglobulinemia was a prominent feature in most groups, IgG being particularly raised in active chronic hepatitis, IgM in primary biliary cirrhosis, and IgA in alcoholic liver disease, resp. IgE was often increased in alcoholic liver disease and was frequently low in hepatic tumors, whereas IgD showed no typical pattern in any liver disorder. SMA was most frequently found in active chronic hepatitis (68%), and MA in primary biliary cirrhosis (58%), while ANA was detected in 50% of the patients with active chronic hepatitis. However, a pronounced over-lap of tissue antibodies was observed among the various groups of liver disease, particularly in active chronic hepatitis and primary biliary cirrhosis. The concurrent presence of SMA and ANA was most frequent in active chronic hepatitis. Antibody titers might have provided better diagnostic discrimination, since titration of antibodies was not performed. Low C3 levels in active chronic hepatitis were correlated with low levels of other liver synthesized proteins, and no evidence was found on increased consumption by immunologic reactions.

0539 THE ASSOCIATION OF FAMILIAL LIVER DISEASE, SUBEPIDERMAL IMMUNOPROTEINS, AND MEMBRANOPROLIFERATIVE GLOMERULONEPHRITIS.

(Eng.) Dobrin, R. S.; Hoyer, J. R.; Nevins, T. E.; Sharp, H.; Gentry, W. C.; Vernier, R. L. (Children's Hosp. Medical Center of Northern California, 51 and Grove St., Oakland, CA 94609). *J. Pediatr.* 90 (6):901-909; 1977.

A new form of congenital hepatic disease is reported. Each of the four siblings had splenomegaly, hypersplenism, a small liver, biochemical evidence of hepatic excretory dysfunction and hepatocellular damage, kidneys without demonstrable cysts, and normal blood pressure. An evaluation of serum immunoproteins, autoantibodies, histocompatibility antigens, and mixed lymphocyte reactivity further defined the immunologic features of this syndrome. Extrahepatic manifestations included a papulosquamous dermatitis with deposition of immunoglobulins and complement in both normal and abnormal skin; a membranoproliferative glomerulonephritis with subendothelial deposits; arthritis; and pericardial, pleural, and synovial effusions. Further evaluation of this family is required to better understand the pathogenesis of this disease.

0540 CRYPTOGENIC LIVER ABSCESS.

(Ger.) Gunther, B.; Gruner, A.; Bull, U. (Chirurgische Klinik der Universitat, Nussbaumstrasse 20, D-8000 Munich 2, W. Germany). *Munch. Med. Wochenschr.* 119(9):305-308; 1977.

Cryptogenic liver abscess was diagnosed in a 61-yr-old woman and a 50-yr-old man by liver scintigraphy and celiacography (in one case). Both patients had fever and were in severely impaired general condition, but there were no pathognomonic symptoms. After aspiration of the purulent liquid, transperitoneal drainage was applied. The cavity was irrigated daily with saline solution containing antibiotics and enzyme preparations. The treatment was successful, both patients were in good condition at discharge and at the follow-up several months later, at which time no filling defects were seen in the liver scintigraphically. The findings indicate that transperitoneal open drainage is the method of choice in the treatment of patients with cryptogenic liver abscess.

0541 PROGNOSIS OF HEPATOPATHY IN HOMOZYGOUS ALPHA-1-ANTITRYPSIN DEFICIENCY.

(Ger.) Karitzky, D.; Kunzer, W. (Universitats-Kinderklinik, D-7600 Freiburg i. Br., W. Germany). *Monatsschr. Kinderheilkd.* 125(5):472-473; 1977.

The prognosis of children with hepatopathy with homozygous alpha$_1$-antitrypsin deficiency (aATD) of the protease inhibitor type ZZ is discussed on the basis of the observation of 10 cases. The aATD was detected at the age of 3-8 weeks in connection with jaundice, hepatomegaly, or dystrophy in five cases, and serendipitously in five others. In the latter group, only one child developed progressive liver cirrhosis. In four of the other five patients, in whom aATD was diagnosed at an early age in connection with liver cirrhosis, bile duct hypoplasia, infectious hepatitis, or liver fibrosis, the initially highly elevated transaminase levels and other clinical findings normalized during the follow-up period (6-15 yr). The aATD was subject to fluctuations, and its increase was accompanied by the normalization of the transaminase level. The findings indicate that the normalization of the transaminase levels by the age of 3-5 yr is prognostically favorable, and that the frequency of juvenile cirrhosis in children with aATD is lower than the 20-30% it is generally believed to be. Persons with homozygous aATD are not overrepresented among patients with liver cirrhosis.

0542 ALPHA-FETOPROTEIN AND THE DIAGNOSIS OF LIVER CELL CANCER.

(Eng.) Purves, L. R. *In: Liver Cell Cancer.* Edited by H. M. Cameron, D. A. Linsell, and G. P. Warwick. (New York: Elsevier Scientific Publishing Company): 61-79; 1976.

The physiology of alpha fetoprotein (AFP) is described, and its use in screening for liver cell carcinoma is reviewed. The use of AFP in the diagnosis of liver cell cancer is invaluable; most cases can be accurately diagnosed or justification can be provided to pursue the diagnosis by other means. Whether the measurement of AFP is justified as an epidemiological tool is doubtful, since there is a normal AFP level (the effects of subclinical hepatitis altered this normal level) and since liver cell cancer is, in general, not responsive to treatment. Further prospective surveys using radioimmunoassay for the quantitation of AFP are necessary before it can be used to detect evolving cancer at an early enough stage to be beneficial to the patient.

0543 THERAPEUTIC INDICATIONS FOR CHILDREN WITH PRIMARY LIVER TUMORS.

(Fre.) Mitrofanoff, P. (No affiliation given). *Ann. Chir. Infant.* 17(5/6):479-483; 1976.

The types of therapy for children with primary liver tumors are reviewed. Surgery (tentative hepatectomy) is recommended for malignant tumors, as radiotherapy or chemotherapy is not very successful. However, radiotherapy (up to 1,000 rads) is indicated for stopping the involution of angioma, and, in serious cases, ligature of the hepatic artery has been effective. Corticotherapy has also been used for fast-growing angiomas. Surgery has been used for cystic lymphangiomas. Angiomas usually occur in the first 3 months of life, but malignant tumors usually develop later. Malignancies can be detected by clinical and biological tests and radiological vascular exploration. Determination of α-fetoprotein levels is especially useful in distinguishing between angiomas and hamartomas in young infants. Surgery for angioma has proved fatal in some cases: 6/17 children died after excision, but 3/3 given radiotherapy were cured. A review of 81 children with malignant tumors (hepatoblastoma/hepatocarcinomas and sarcoma) showed that 68 had died, compared to 89/155 with benign tumors (angioma and hamartoma).

0544 THE TREATMENT OF LIVER CELL CANCER. (Eng.) Falkson, G. *In: Liver Cell Cancer.* Edited by H. M. Cameron, D. A. Linsell, and G. P. Warwick. (New York: Elsevier Scientific Publishing Company): 81-92; 1976.

Surgery, radiotherapy, and chemotherapy of liver cell cancer are reviewed. Primary liver cell cancer is seldom resectable, and is not radiosensitive. Clinical control must be sought by chemotherapy. 5-Fluorouracil given intravenously has been generally accepted in the U.S.A., but worthwhile responses have not followed extensive clinical trial of this agent in Bantu patients. Alkylating agents, antimetabolites, antibiotics, and other drugs have been carefully evaluated in patients with liver cell cancer and have been found not to be of particular value. Recent advances in chemotherapy make it more likely that treatment with cytostatic agents will lead to better results.

0545 A PHASE II STUDY OF ADRIAMYCIN (NSC 123127) IN PATIENTS WITH HEPATOCELLULAR CARCINOMA FROM ZAMBIA AND THE UNITED STATES. (Eng.) Vogel, C. L.; Bayley, A. C.; Brooker, R. J.; Anthony, P. P.; Ziegler, J. L. (Univ. Miami, Sch. Medicine, 1400 N.W. 10th Ave., Center House--Roof Garden, Miami, FL 33136). *Cancer* 39(5):1923-1929; 1977.

Nineteen Zambian and 22 American patients with hepatocellular carcinoma were treated with adriamycin (ADM; 20-75 mg/m^2, i.v, depending on the initial serum bilirubin level) every 3 weeks. Four of 16 "good risk" Zambian and American patients (those eligible for 75 mg of drug) had objective responses, while in 5 others there was evidence of either transient tumor regression or disease stabilization; only 3 of 25 "poor risk" patients who received 20-60 mg/m^2 had objective responses. Even in this latter group, however, transient objective signs of tumor regression were noted in four patients. Toxicity at 75 mg/m^2 was more profound than with lower doses but was tolerable and reversible. It is concluded that ADM does yield reproducible and objective antitumor responses in hepatocellular carcinoma and that it is worthy of further investigation.

0546 5-FLUOROURACIL IN HEPATOCELLULAR CARCINOMA: REPORT OF TWENTY-ONE CASES. (Eng.) Link, J. S.; Bateman, J. R.; Paroly, W. S.; Durkin, W. J.; Peters, R. L. (Univ. Southern California Sch. Medicine, LAC-USC-MC, 1200 N. State St., Los Angeles, CA 90033). *Cancer* 39(5):1936-1939; 1977.

Twenty-one patients with biopsy-proven hepatocellular carcinoma were treated with oral (group 1) or intravenous (group 2) 5-fluorouracil (15 mg/kg/week for a period of 6 weeks) according to a randomized treatment schedule. There were no objective responses in either treatment group. One patient on oral therapy showed a transient 25% tumor reduction, and another patient showed stable disease for 12 weeks after the beginning of the therapy. Overall response in the study was zero percent, but two patients did receive marginal therapeutic benefit. The median survival for the group was 65 days. The median survival for orally treated patients was 72 days compared to 45 days for the group treated with intravenous 5-fluorouracil ($p<0.20$). Toxicity occurred in 46% of patients treated, but was tolerable; mild gastrointestinal toxicity was the most commonly noted form, occurring in 30% of patients. Marrow suppression occurred in 18%, but with no severe episodes. It is suggested that weekly oral or intravenous 5-fluorouracil administration has a minimal role in the treatment of hepatocellular carcinoma.

0547 THE GEOGRAPHIC PATHOLOGY OF LIVER CELL CANCER. (Eng.) Linsell, D. A.; Higginson, J. *In: Liver Cell Cancer.* Edited by H. M. Cameron, D. A. Linsell, and G. P. Warwick. (New York: Elsevier Scientific Publishing Company): 1-16; 1976.

The frequency and types of liver cancers observed in different areas of the world are reviewed. Liver cancer remains a major problem of many areas of the developing world and is probably one of the most frequent cancers in man. Although there is some evidence that the incidence may be falling in Africa, there are reports of a higher incidence in Europe. The association of the cancer with cirrhosis is well established, but the precise sequence of events is still unclear. One type of cirrhosis, the macronodular, is more frequently associated with the cancer, and this is the cirrhosis most commonly observed in countries reporting high frequencies of liver cell cancer. It is now possible to evaluate some of the environmental factors, both viral and chemical, that may be involved in this entity's increased frequency.

0548 THE CLINICAL PROBLEM OF LIVER CELL CANCER IN A HIGH INCIDENCE AREA. (Eng.) Bagshawe, A.; Cameron, H. M. *In: Liver Cell Cancer.* Edited by H. M. Cameron, D. A. Linsell, and G. P. Warwick. (New York: Elsevier Scientific Publishing Company): 45-59; 1976.

The clinical features of liver cell cancer in developing countries are described and compared with those seen in Europe and America. In the latter countries, it affects older people, is often superimposed on recognized cirrhosis, and produces a less dramatic illness. The disease must be distinguished from liver abscess, parasitic liver diseases, and cirrhosis, as well as from secondary liver tumors; the last are relatively infrequent in most areas with a high incidence of liver cell cancer. Final proof of the diagnosis rests on the histology of the tumor, but the elevation of serum alpha fetoprotein to a level detectable by immunodiffusion is seldom seen, except in the liver cell cancer, pregnancy, and certain teratomas. More sensitive methods of measuring alpha fetoprotein may give false positive results. Hepatic scintigraphy and angiography allow accurate tumor localization for biopsy and will determine its extent and vascularization if surgical resection or intraarterial perfusion of chemotherapeutic agents is planned. However, the results of chemotherapy are so poor that there is seldom justification for subjecting patients to the toxicity of conventional cytotoxic drugs; management usually consists of the relief of pain and sympathetic terminal care.

0549 THE BACKGROUND TO LIVER CELL CANCER. (Eng.) Anthony, P. P. *In: Liver Cell Cancer*. Edited by H. M. Cameron, D. A. Linsell, and G. P. Warwick. (New York: Elsevier Scientific Publishing Company): 93-120; 1976.

Liver diseases, occurring in geographical areas where hepatocellular carcinoma is common, and factors thought to be involved in the genesis of cirrhosis are reviewed. Liver cell cancer occurs most frequently in cirrhotic liver, and it seems that almost any disease process that causes cirrhosis is associated with an increased risk of malignancy. The magnitude of this risk varies throughout the world, and it may be determined by differences in etiology. Race, sex, and genetics have little role to play. Alcoholism and, possibly, malnutrition have a potentiating influence, the nature of which is unclear. Parasites are not related to liver cell carcinoma, but infestation with various flukes, notably *Clonorchis sinesis*, is associated with a high incidence of intrahepatic bile duct carcinoma in South East Asia. Naturally occurring carcinogens, particularly aflatoxins, and the hepatitis B virus may be responsible for the majority of liver cell carcinoma in the tropics and subtropics. Liver cell cancer, in all its forms, remains a relatively rare disease in western countries, but its incidence is slowly rising and may be further increased by newly discovered, though yet unproven, carcinogens such as gonadal steroids and vinyl chloride monomer.

0550 PRIMARY HEPATOCELLULAR CARCINOMA--A RESUME. (Eng.) Rubin, E. *In: Liver Cell Cancer*. Edited by H. M. Cameron, D. A. Linsell, and G. P. Warwick. (New York: Elsevier Scientific Publishing Company): 279-286; 1976.

Factors involved in the study of hepatocellular carcinoma are reviewed. The origin and nature of primary hepatocellular carcinoma remains an enigma, but a number of factors render the tumor an excellent model for the study of neoplasms. These include world-wide incidence, geographic distribution, putative association with toxins, the high incidence of production of embryonal proteins, and the ease of production of the cancer in experimental animals. The challenges for the future include a better understanding of the reasons underlying the geographic distribution, the relationship of tumor development to cirrhosis and hyperplastic nodules, the multicentric nature of the tumor, the induction of tumors by chemicals in experimental animals and modifying factors, and the immunologic aspects of primary hepatic carcinoma.

0551 EARLY LESIONS AND DEVELOPMENT OF PRIMARY HEPATOCELLULAR CARCINOMA IN MAN--ASSOCIATION WITH HEPATITIS B VIRAL INFECTION. (Eng.) Okita, K.; Kodama, T.; Harada, T.; Noda, K.; Fukumoto, Y.; Takenami, T.; *et al.* (Yamaguchi Univ., Sch. Medicine, Ube City, Yamaguchi Prefecture 755, Japan). *Gastroenterol. Jpn.* 12(2):51-57; 1977.

Serum and liver biopsy specimens from 103 patients with chronic liver disease were examined for an association between serum α-fetoprotein (AFP) and liver cell dysplasia, which is postulated to be a precursor of primary hepatocellular carcinoma. Among 58 cases of chronic active hepatitis, 14 showed liver cell dysplasia, and 71.4% of these 14 cases had a serum AFP level of >200 ng/ml. Of the remaining 44 cases, 43.1% had a serum AFP level of >200 ng/ml. Liver cell dysplasia was also seen in 13/55 cases of liver cirrhosis, and 69.2% of these 13 cases had a serum AFP level of >200 ng/ml; this level was found in only 30.9% of the remaining 42 cases. Direct fluorescence antibody studies of 20 patients with high serum AFP levels indicated a specific localization of AFP in the dysplastic cells. Hepatitis B-associated DNA polymerase assays revealed a significantly high level of DNA polymerase activity (mean, about 1,800 counts/min) in the sera of patients with chronic active hepatitis, compared with a background level of 900 counts/min for normal subjects.

0552 TREATMENT OF VARIOUS FORMS OF ICTERUS OR CHOLESTASIS WITH PHENOBARBITAL. (Ger.) Stiehl, A. (Med. Univ.-Klinik Heidelberg, Bergheimer Strasse 59, 6900 Heidelberg, W. Germany). *Z. Gastroenterol.* 15(6):404-416; 1977.

The results of the treatment of various forms of icterus or cholestasis with phenobarbital (PB) are reviewed. In the liver, PB induces an increase in the endoplasmic reticulum, an increase of cytoplasmic proteins, and induction of microsomal enzymes such as bilirubin (BL) glucuronyl transferase, which catalyzes the conjugation of BL. PB also increases bile flow, and it improves BL conjugation in patients with Crigler-Najjar syndrome, Gilbert-Meulengracht disease, or newborn icterus. In patients with insufficient BL excretion, such as those with Dubin-Johnson disease, PB caused a decrease in serum BL levels by increasing biliary BL excretion. In cholestasis, PB caused an increase in biliary excretion of bile-binding substances, leading to a decrease in icterus, pruritus, and hyperlipemia. Daily therapy with PB (120-300 mg) improved icterus and pruritus in the majority of patients, but it was discontinued in some due to heavy sedation. In addition to improving icterus and pruritus, PB has also been observed to produce a marked improvement in the plasma clearance of rose bengal and cholestyramine. Side-effects attributed to PB include a rise in alkaline phosphatase activity and CNS and inflammatory symptoms in newborns.

0553 PURPURA CRYOMACROGLOBULINEMIA IN TRANSIENT HEPATIC PORPHYRIA WITH LIVER CIRRHOSIS. (Ger.) Simon, N.; Husz, S.; Masszi, J. (Univ.-Hautklinik, Postfach 480, H-6701 Szeged, Hungary). *Hautarzt* 28(6):303-307; 1977.

A 49-yr-old man with porphyria cutanea tarda and histologically verified liver cirrhosis also had purpuric, urticarial, and telangiectasial skin symptoms as well as a mixed IgM/IgG cryomacroglobulinemia for 8 yr. The liver disease was considered the primary affliction, accompanied by secondary cryomacroglobulinemia. Histology of the upper dermis of purpuric and urticarial skin revealed RBC extravasates, perivesicular infiltrates from polymorphous nuclear neutrophilic leukocytes, lymphocytes, fibroblasts, individual plasma cells, and eosinophil granulocytes. Immunofluorescence of purpuric lesions showed homogenous vessel color, many small granular deposits, thrombus formation with anti-human globulin, IgG, IgM, and complement. In urticarial skin, the granular deposits along the papillary vessels were much more marked than in purpuric lesions. Porphyrin was not detected in either skin lesion. Histology of a liver biopsy showed typical signs of liver cirrhosis. The clinical picture and amount of excreted porphyrin were not influenced by repetitive bleedings, and treatment with prednisolone (30 mg/day for 5 months, decreased to 10 mg/day for 3 further months) was only partially effective. However, porphyrin content in urine returned to normal, which could have been due to long-term steroid treatment or to progression of cirrhosis.

0554 ON EOSINOPHILIC HEPATOPATHY IN EOSINOPHILIC RETICULAR HYPERPLASIA OF THE SKIN. (Ger.) Korting, G. W.; Schramm, P. (Hautklinik, Johannes-Gutenberg-Universitat, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Arch. Dermatol. Res.* 259(1):43-47; 1977.

Eosinophilic hepatopathy was diagnosed in a 40-yr-old woman with eosinophilic reticular hyperplasia of the skin. The anamnestic data included endogenous eczema at the age of 15 yr, transient jaundice in 1966, and ampicillin-induced exanthema in 1974. A tumor, tentatively diagnosed as eosinophilic granuloma, was removed from the buccal cavity in 1974, at which time 26% eosinophilia of the blood was found. The patient developed nodules in the mandibular region, nodular infiltration in the submandibular, sternal and thoracic regions, and eczema of the hip and hands. The blood eosinophil count was 33%, the sternal bone marrow showed hypereosinophilia, and Australia antigen was found in the serum. The suspect liver scintigram and the pathological serum enzyme levels (glutamic oxaloacetic transaminase, 76 mU/ml; glutamic-pyruvic transaminase, 187 mU/ml; gamma-glutamyl transaminase, 49 mU/ml) prompted laparoscopy and liver biopsy, which revealed HBsAg-positive chronic persistent hepatitis, proliferation of fibers in the portal region, and focal clusters of eosinophil cells (eosinophilic hepatopathy). The findings indicate that, contrary to current belief, the involvement of internal organs, particularly of the liver, in reticular hyperplasia of the skin seems to be possible.

0555 REYE'S SYNDROME. (Ger.) Wehinger, H. (Universitats-Kinderklinik Freiburg i. Br., W. Germany). *Klin. Paediatr.* 189(3):206-210; 1977.

The clinical symptoms, diagnosis, etiology, pathogenesis, and therapy of Reye's syndrome are presented. The condition is an acute and often fatal childhood syndrome of encephalopathy and fatty degeneration of the liver, marked by rapid development of brain swelling and hepatomegaly and by disturbed consciousness and seizures. The smooth endoplasmic reticulum shows a proliferation and an increase of peroxisomes, and the glycogen content of the endoplasmic reticulum decreases with severity of the disease. The disease is more predominant in girls, and in the majority of cases it is preceded by influenza B or varicella infection. Elevated ammonia and creatinine phosphokinase levels are also common, as is mitochondrial damage. The early disease stages are characterized by lethargy, delirium, and intermittent coma, whereas decerebral symptoms and muscle hypotony precede death. Intensive monitoring of electrolytes, acid-base status, serum osmolarity, and blood sugar is recommended. Therapy with neomycin, citrullin, vitamin K, glucose, and insulin is warranted for all stages. When cerebral edema is present, Mannit and dexamethasone should be given; intubation is required for respiratory alkalosis. Phenobarbital and diphenylhydantoin should be administered when seizures occur.

0556 REYE'S SYNDROME. (Ger.) Bohles, H. (Universitats-Kinderklinik, 8520 Erlangen, Loschgestr. 15, W. Germany). *Dtsch. Med. Wochenschr.* 102(12):446-451; 1977.

Pathogenetic, clinical, biochemical, and therapeutic aspects of Reye's syndrome (RS) are reviewed. Viruses, toxins (aflatoxin), acetylsalicylic acid, isopropyl alcohol, and short-chained fatty acids have been assumed to be the etiological factors by various authors. It was possible to reproduce the symptoms of RS more or less completely in animals by means of aflatoxins, hypoglycine, and 4-pentaenic acid. RS appears to be the final stage of a pathogenetic process that may be of infectious, toxic, or allergic etiology. The hepatic changes in RS include slight enlargement and high consistency of the liver, diffuse fatty degeneration of the parenchymal cells of hexagonal shape, usually without liver cell necrosis, and mitochondrial degeneration. The fat contains no birefringent lipids. Increased hepatic glycogen was often seen, but cholestasis was never found. The laboratory tests show hypoglycemia and usually a low glucose level in the cerebrospinal fluid, increased glutamic-oxaloacetic and glutamic-pyruvic transaminase activities in the liver, and high blood ammonia levels. None of the therapeutic methods tested or proposed have been substantiated. Peritoneal dialysis, blood exchange, and administration of free blood plasma, glucose with insulin, citrulline, and vitamin K have been used with varying success. Quick diagnosis and intensive treatment are essential. Cooperative studies on RS will be necessary to obtain relevant, reliable findings.

557 CURRENT STATUS OF THE PROPHYLAXIS OF WILSON'S DISEASE. (Fre.) Sternlieb, I. (Albert Einstein Coll. Medicine, 1300 Morris Park ve., Bronx, NY 10461). *Rev. Fr. Gastroenterol.* 125):41-44; 1977.

The treatment of 76 Wilson's disease (WD) patients ith 1 g/day D-penicillamine is presented. Sixty atients had classical WD with a reduced ceruloplasmin level (CL) and elevated hepatic copper (HC), had a normal CL and elevated HC, 5 had Kayser-leischer rings, and 8 had a reduced CL. Two atients who did not receive regular therapy eveloped psychic symptoms. Side-effects attributed o D-penicillamine were observed only in three atients: elastosis perforans serpiginosa after 6 yr of therapy, nephrosis (the D-penicillamine was eplaced by triethylenetetramine), and nephrocalcinosis. No intellectual or physical deterioration, owever, occurred in any of the patients during -penicillamine therapy.

558 THE PRESENT STATUS OF LIVER TRANSPLANTATION. (Eng.) Calne, R. Y. (Addenbrooke's Hosp., ills Rd., Cambridge CB2 2QQ, England). *Transplant. roc.* 9(1):209-216; 1977.

ne hundred and fifty-six patients who received liver rafts in Denver (106 patients) and in Cambridge/ing's College Hospital series (50 patients) were tudied. Of these 106 patients, 27 lived 1 yr or ore after liver grafting and 16 were alive at 1-6 r following grafting. Rejection was the main ause of death in about 10% of the cases. Twenty f the 59 patients age ≤18 yr survived more than yr, and 14 are currently living; one of these s the longest survivor (6.3 yr). Of the 50 atients in the Cambridge/King's series, 12 survived more than 6 months, 4 of these lived beyond yr, and 10 are currently living (one for 2.5 yr). he longest survivor (5.2 yr) in this series died f biliary obstruction secondary to calcified sludge ormation blocking the anastomosis between the gallbladder and the recipient common duct. The major omplications resulting in death were biliary tract disasters, particularly fistula formation, anastomotic stenosis, and blockage with sludge or superimposed infections, e.g., pneumonia and intraperitoneal abscess or tumor recurrence. A simple method of short-term liver preservation and a new technique of biliary drainage using the gallbladder as a conduit are suggested to produce gratifying results. The low incidence of progressive uncontrollable liver allograft rejection could contribute to an overall understanding of renal and cardiac grafts.

0559 HETEROTOPIC (AUXILIARY) LIVER TRANSPLANTATION IN MAN. (Eng.) Fortner, J. G.; Kim, D. K.; Shiu, M. H.; Yeh, S. D. J.; Howland, W. S.; Beattie, E. J. (Memorial Hosp., 1275 York Ave., New York, NY 10021). *Transplant. Proc.* 9(1):217-221; 1977.

Experience with and results of heterotopic liver transplants (the recipient's liver remains and the donor liver is transplanted to another area) in 7 patients aged 3-72 yr are presented. Six patients had an entire liver transplanted, and one received only a left lobe graft; the latter patient died about 24 hr postoperatively due to acute congestion of the graft, renal failure, and cardiac arrest. Three patients had well-functioning grafts for prolonged periods of time. One is living and well with a normally functioning graft more than 4 yr after transplantation. One patient lived 8 months with a normally functioning graft and died due to infection in her own liver secondary to obstruction from the bile duct cancer. The third patient initially had an uneventful course when a rejection reaction developed; a minimal increase in immunosuppression led to *Pneumocystis carinii* infection and death at 3.5 months. Serial ^{99}Tc scans in one patient showed homogeneous uptake in both the recipient's graft and patient's liver and spleen without apparent significant quantitative difference from 5th to 54th post-transplant day. Rose bengal uptake and excretion were normal. The causes of transplantation failure in six of the cases were multiple abscesses in recipient liver, breakdown of cholecystojejunostomy, hemorrhage and acute congestion of graft, *Pneumocystis* pneumonia, aspiration pneumonia and monilial esophagitis, and septicemia and progressive necrosis. One patient is alive and well. It is suggested that the heterotopic auxiliary liver transplant is clinically useful for selected patients with end-stage noncancerous liver disease.

0560 SELECTIVE CELIAC ANGIOGRAPHY AND SURGICAL EXPLORATION FOR SUSPECTED LIVER CANCER. A COMPARATIVE STUDY OF 196 PATIENTS. (Eng.) Almersjo, O.; Hafstrom, L.; Rosengren, K.; Wedel, N. (Sahlgren Hosp., Univ. Goteborg, Goteborg, Sweden). *Am. J. Surg.* 131(6):676-679; 1976.

0561 PRIMARY HEPATIC CARCINOMA IN THAILAND. (Eng.) Stitnimankarn, T. (Siriraj Hosp., Mahidol Univ., Bangkok, Thailand). *Gann Monogr. Cancer Res.* 18:123-127; 1976.

0562 LIVER METASTASES: DIAGNOSTIC VALUE OF BLOOD TESTS, SCINTISCANNING AND LAPAROSCOPY. (Ger.) Angehrn, F. G.; Schmid, P.; Pescia, R.; *et al.* (Stadtspit. Triemli, Zurich. Switzerland). *Dtsch. Med. Wochenschr.* 101(28):1047-1055; 1976.

0563 SEMIQUANTITATIVE ASSESSMENT OF HEPATIC FUNCTION IN OUTPATIENTS BY BREATH ANALYSIS AFTER ORAL ADMINISTRATION OF ^{14}C-AMINOPYRINE. (Eng.) Hanik, L.; Eriksson, S. (Dept. Internal Medicine, Univ. Lund, Lund, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):31; 1977.

0564 THE EFFECT OF HEPATIC DEARTERIALIZATION AND REDEARTERIALIZATION ON CARCINOID LIVER METASTASES. (Eng.) Sivula, A.; Sipponen, P. (Univ. Central Hosp., Helsinki, Finland). *Ann. Chir. Gynaecol.* 65(3):168-175; 1976.

0565 SERUM CHOLESTEROL AND BILE ACID IN PRIMARY HEPATOMA. (Eng.) Hirayama, C.; Irisa, T. (Faculty Medicine, Tottori Univ., Yonago, Japan). *Clin. Chim. Acta* 71(1):21-25; 1976.

0566 SOLITARY SMALL HEPATOCELLULAR CARCINOMA. (Eng.) Mahmood, K.; Schatzki, P. F. (Univ. Pittsburgh Medical Center, Pittsburgh, PA 15213). *Am. J. Dig. Dis.* 21(6):496-502; 1976.

0567 GEOGRAPHIC CORRELATION BETWEEN MORTALITY FROM PRIMARY HEPATIC CARCINOMA AND PREVALENCE OF HEPATITIS B SURFACE ANTIGEN IN GREECE. (Eng.) Trichopoulos, D.; Papaevangelou, G.; Violaki, M.; *et al.* (Univ. Athens Medical Sch., Athens, Greece). *Br. J. Cancer* 34(1):83-87; 1976.

0568 DEMONSTRATION OF A LIVER ABSCESS BY ERC. (Eng.) Weizel, A.; Czygan, P. (Medical Dept., Univ. Heidelberg, Heidelberg, W. Germany). *Endoscopy* 8(2):110-111; 1976.

0569 SURVIVAL AMONG PATIENTS WITH LIVER METASTASES FROM CANCER OF THE COLON AND RECTUM. (Eng.) Fischerman, K.; Peterson, C. F.; Lindkaer Jensen, S.; *et al.* (Rigshospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 37):111-115; 1976.

0570 RESULTS OF LIVER DEARTERIALIZATION COMBINED WITH REGIONAL INFUSION OF 5 FLUOROURACIL FOR LIVER CANCER. (Eng.) Almersjo, O.; Bengmark, S.; Hafstrom, L.; Leissner, K. H. (Dept. Surg. II, Univ. Goteborg, Goteborg, Sweden). *Acta Chir. Scand.* 142(2):131-138; 1976.

0571 HLA AND THE GENETICS OF HEMOCHROMATOSIS [Abstract]. (Eng.) Muir, W. A.; McLaren, G. D.; Braun, W. E.; Schachter, B. Z. (Dept. Medicine, Case Western Reserve Univ., Cleveland, OH). *Clin. Res.* 25(4):573A; 1977.

0572 HISTOCHEMICAL DEMONSTRATION OF LIVER COPPER AND COPPER CARRYING PROTEIN IN CHRONIC LIVER DISEASE [Abstract]. (Eng.) Jain, S.; Scheuer, P. J.; Archer, B.; Newman, S.; Sherlock, S. (Royal Free Hosp., Pond St., London, England). *Clin. Res.* 18(11):A953-A954; 1977.

0573 SERIAL CHANGES IN PLASMA TYROSINE AND PHENYLALANINE LEVELS IN PATIENTS WITH FULMINANT HEPATIC FAILURE TREATED BY POLYACRYLONITRILE HAEMODIALYSIS: RELATIONSHIP TO COMA [Abstract]. (Eng.) Chase, R. A.; Davies, M.; Trewby, P. N.; Silk, D. B. A.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Gut* 18(11):A952-A953; 1977.

0574 PERIPHERAL MACROPHAGE FUNCTION IN PATIENTS WITH CHRONIC LIVER DISEASE [Abstract]. (Eng.) Triger, D. R.; Kingham, J. G. C.; Lloyd, R. S.; Wright, R. (Dept. Medicine, Southampton Univ., Southampton, England). *Gut* 18(11):A979; 1977.

0575 PROGNOSIS IN CHILDHOOD OF LIVER DISEASE ASSOCIATED WITH ALPHA-1-ANTITRYPSIN DEFICIENCY, TYPE PiZ (ALPHA-1-ANTITRYPSIN DEFICIENCY) [Abstract]. (Eng.) Mowat, A. P.; Psacharopoulos, H.; Williams, R.; Portmann, B.; Tait, R. A. J. (King's Coll. Hosp. Medical Sch., London, England). *Gut* 18(11):A978; 1977.

0576 THE DETECTION OF HETEROZYGOTES IN FAMILIAL INTRAHEPATIC CHOLESTASIS (F.I.C) [Abstract]. (Eng.) Bidot, P.; LaBrecque, D. R.; Hsia, Y. E.; Riely, C. A. (Dept. Human Genetics, Yale Univ., New Haven, CT). *Am. J. Hum. Genet.* 29(6):23A; 1977.

0577 DIAZEPAM KINETICS AND SEDATION IN CHRONIC LIVER DISEASE [Abstract]. (Eng.) McConnell, J. B.; Davis, M.; Curry, S.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Gut* 18(11):A988; 1977.

0578 PLOIDY PATTERNS OF HUMAN LIVER CELLS IN CHRONIC LIVER DISEASES [Abstract]. (Eng.) Ashihara, T.; Kitamura, O.; Takeoka, O.; Kagawa, K.; Okuda, K.; Takino, T.; Fujita, S. (Shiga Univ. Medical Science, Shiga, Japan). *Gastroenterology* 73(5):1211; 1977.

0579 CULLEN'S SIGN AFTER PERCUTANEOUS LIVER BIOPSY [Letter to Editor]. (Eng.) Capron,

J. P.; Chivrac, D.; Delamarre, J.; Dupas, J. L.; Lorriaux, A. (Centre Hospitalier Universitaire, 80 030 Amiens, France). *Gastroenterology* 73(5): 1185; 1977.

0580 THE DYNAMICS OF AMMONIA METABOLISM IN MAN [Abstract]. (Eng.) Lockwood, A. H.; McDonald, J. M.; Reiman, R. E.; Gelbard, A. S.; Laughlin, J. S.; Duffy, T. E.; Plum, F. (Cornell Medical Coll., Ithaca, NY). *Gastroenterology* 73(5):1232; 1977.

0581 A COMPARATIVE ULTRASTRUCTURAL STUDY OF INHERITED UREA CYCLE ENZYME DEFICIENCY STATES AND REYE'S SYNDROME (RS) [Abstract]. (Eng.) Latham, P.; LaBrecque, D. R.; Kashgarian, M.; Klatskin, G. R. (Dept. Medicine, Yale Univ., New Haven, CT). *Gastroenterology* 73(5):1230; 1977.

0582 LIVER PATHOLOGY IN INHERITED UREA CYCLE ENZYME DEFICIENCY STATES CONTRASTED WITH THAT IN REYE SYNDROME [Abstract]. (Eng.) LaBrecque, D. R.; Latham, P.; Riely, C. A.; Hsia, Y. E.; Klatskin, G. R. (Yale Univ. Sch. Medicine, New Haven, CT). *Gastroenterology* 73(5):1230; 1977.

0583 A METABOLIC EVALUATION OF HEPATIC COMA AND RECOVERY [Abstract]. (Eng.) Hutson, D. G.; Dombro, R.; Zeppa, R.; Ono, J.; Levi, J. U. (Univ. Miami Sch. Medicine, Miami, FL 33152). *Gastroenterology* 73(5):1226; 1977.

0584 CONGENITAL BILIARY FIBROANGIOMATOSIS: ANATOMO-CLINICAL CORRELATION [Abstract]. (Eng.) Patricio, F. R. S.; Fagundes Neto, U.; Wehba, J. (No affiliation given). *Arq. Gastroenterol.* 14(3):161; 1977.

See also, 0004, 0131, 0136, 0184, 0253, 0254, 0255, 0258, 0271, 0283, 0287, 0393, 0400, 0627, 0629, 0635, 0688, 0673, 0681, 0684, 0686, 0709, 0721, 0747, 0748, 0749, 0751, 0752.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

0585 CHOLESTATIC JAUNDICE IN INFANCY: DIAGNOSIS, DIFFERENTIAL DIAGNOSIS AND TREATMENT. (Eng.) Poley, J. R.; Magnani, H. N. (Universitats-Kinderklinik, Prittwitzstrasse 43, 79 Ulm/Donau, W. Germany). *Aust. Paediatr. J.* 12(3): 134-153; 1976.

Common types of persistent cholestatic jaundice (CJ) in infancy are reviewed along with tests for differentiating between intrahepatic cholestasis (IC) and extrahepatic cholestasis (EC). Most infants with CJ may have some type of inflammatory lesion such as seen in neonatal hepatitis (NH) syndromes, or they may have one of the intrahepatic biliary hypoplasia (IBH) syndromes or some type of obstructive lesion of the extrahepatic biliary tree. IBH syndromes probably account for a major group of infants that present with early IC, and patients with IBH present with more severe cholestasis than those with NH. The striking abnormality on biopsy in patients with IBH is the decrease in number and caliber of the bile ducts in portal tracts; sometimes, these bile ducts cannot be identified at all. Three types of lesions characterize EC: true atresia of the common bile duct or hepatic duct, lesions showing obliteration of extensive portions of the sometimes hypoplastic extrahepatic biliary tree, or the absence of recognizable structures reminiscent of bile ducts in the area of the porta hepatis of the hepatoduodenal ligament. The most promising tests for differentiating between IC and EC in infantile CJ are tests for serum 5'-nucleotidase and tests for serum lipoprotein-X (LP-X) combined with cholestyramine (CSM) administration. The absence of serum LP-X in infants with CJ below 7 months of age dictates against a diagnosis of biliary atresia, whereas a positive test (>30 mg/dl) indicates severe cholestasis. When LP-X is measured after CSM administration, a decrease in serum LP-X indicates IC, whereas an increase in serum LP-X indicates EC. Surgical exploration should be reserved for patients in whom an obstructive lesion is unequivocally identified. However, no other test, with the exception of surgery, can determine the type of obstructive lesion present.

0586 STUDY OF THE ETIOLOGY AND PATHOGENESIS OF LOW GRADE NONHEMOLYTIC UNCONJUGATED HYPERBILIRUBINEMIA (GILBERT'S DISEASE). (Eng.) Blueger, A. F.; Krupnikova, E. Z.; Sondore, V. Yu.; Semushina, E. P. (Riga Medical Inst., 12 Padomyu bulv, Riga, USSR). *Acta Hepatogastroenterol. (Stuttg.)* 24(3):140-147; 1977.

Clinical and morphological data on 172 adolescent and adult patients with low-grade nonhemolytic unconjugated hyperbilirubinemia (NUH) were analyzed. The constitutional form (group 1) occurred in 111 patients, the posthepatic form (group 2) in 61. The most common clinical findings were a slight jaundice of the sclerae and abdominal pain plus elevated GOT activity and dysproteinemia. ^{51}Cr RBC survival was shortened in 17/31 patients in group 1 and in 11/15 patients in group 2, the mean values being 16 and 15.5 days, resp., versus a control value of 22.4 days. The mean 24-hr urinary glucuronic acid excretion after menthol ingestion decreased in groups 1 and 2 (1,794 and 1,800 mg, resp.) compared to controls (2,189 mg). Hepatic glucuronyl transferase (GT) activity (77-180 nmol/30 min/mg protein) was low in nine patients and low-normal in one. The mean 24-hr fecal urobilinogen excretion was reduced in groups 1 and 2 (117 ± 35 and 110 ± 45 mg, resp.), but it was increased in 12 patients with hereditary hemolytic jaundice (258 ± 158 mg), compared to control value of 163 ± 15 mg. The hepatocytes showed signs of dystrophy, e.g., vacuolated nuclei, reduced number of microvilli, increased amount of lipofuscin pigment, and large areas of agranular endoplasmic reticulum. Decreased GT activity is an important factor in the pathogenesis of low-grade NUH. The results show not only a disturbance in intrahepatic bilirubin metabolism, but also in other functions of the liver.

0587 PREVENTION OF KERNICTERUS, BASED ON RECENT PROGRESS IN BILIRUBIN CHEMISTRY. (Eng.) Brodersen, R. (Inst. Medical Biochemistry, Univ. Aarhus, DK-8000 Aarhus C, Denmark). *Acta Paediatr. Scand.* 66(5):625-634; 1977.

The binding of bilirubin to albumin, its displacement by fatty acids and drugs, and the importance of plasma pH are reviewed in relation to preventing neurotoxic levels of free bilirubin in kernicterus. Bilirubin IX-α(Z), the only type of bilirubin known to be neurotoxic, is bound reversibly to one high-affinity site on human serum albumin (binding constant at 37 C is 7 x 10^7 M). Fatty acid levels higher than four times the molar concentration of albumin displace bilirubin from its primary binding site, as do certain sulfonamides and a number of other drugs, thereby increasing the risk of kernicterus. Sulfisoxazole is capable of precipitating kernicterus in icteric infants. Plasma pH also affects the binding of bilirubin to albumin. An infant with a plasma pH of 7.05 (severe acidosis) and a safe upper level of 10 nmol/l of free bilirubin has plasma albumin that is less than half-saturated with bilirubin and a plasma bilirubin concentration of about 150-200 μM. After correction of the pH, the equilibrium is shifted in favor of the plasma albumin, which can now carry a bilirubin concentration of 300-400 μM and still have a tolerable level of the free pigment. For all cases of suspected bilirubin displacement, a rational therapy is the i.v. administration of albumin. More binding sites are then provided for bilirubin as well as for the competitor, and, with exchange transfusion, certain amounts of both bilirubin and competitor are removed from the body.

0588 EFFECT OF INDOOR LIGHTING VS. DARKNESS ON UNCONJUGATED HYPERBILIRUBINEMIA [Abstract]. (Eng.) Zenone, E. A.; Stoll, M. S.; Ostrow, J. D. (Univ. Pennsylvania Medical Service, Philadelphia, PA). *Gastroenterology* 73(5):1256; 1977.

0589 GENETIC INVESTIGATION IN GILBERT'S SYNDROME. (Ger.) Penner, E.; Mayr, W. R.; Djawan, S.; *et al.* (Ordinariat Med. Computerwissensch. Gastroenterol., Univ. Wien, Wien, Austria). *Schweiz. Med. Wochenschr.* 106(25):860-862; 1976.

0590 ALPHA FETOPROTEIN AND NEONATAL JAUNDICE: CONTRIBUTION TO THE STUDY OF PATHOPHYSIOLOGICAL MECHANISM. (Fre.) Tourne, C. E.; Brettes, J. P.; Guez, G.; Ritter, J.; Gandar, R. (C.H.U., B.P. 426/R 5, F 67005 Strasbourg Cedex, France). *J. Gynecol. Obstet. Biol. Reprod. (Paris)* 6(3): 311-317; 1977.

See also, 0153, 0154, 0645.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

0591 THE ROLE OF PLASMA MEMBRANES IN HEPATOTOXIC EFFECTS. (Eng.) Frimmer, M. (Institut fur Pharmakologie und Toxikologie, Fachbereich Veterinarmedizin, Universitat Giessen, D-6300 Giessen, W. Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 297 (Suppl. 1):S15-S19; 1977.

The effect of three different toxins that act directly on hepatic plasma membranes was studied. Phallolysin from *Amanita phalloides* destroyed plasma membranes and killed cells by an outflow of cytoplasm. Leucocidin from *Pseudomonas aeruginosa* produced Ku^+ loss, swelling, and microcirculatory disturbances in perfused livers but the plasma membranes appeared smooth. It is suggested that swelling may be caused by potassium release with simultaneous uptake of sodium and water and that the receptor for the pseudomonas toxin might be an integral protein of the plasma membranes. Phalloidin from *A. phalloides* affects the intravascular pressure and the plasma membrane invagination and vacuolization *in vivo*. However, isolated hepatocytes develop typical protrusions in the presence of phalloidin. To understand the mechanism of action of phalloidin, the protective effects of trypsin-like enzymes (proteases) and phospholipase A were studied in isolated hepatocytes. Chymotrypsin and elastase were less potent than trypsin as protectors. The protective activity of phospholipase A depended on the concentration of the enzyme and the time of preincubation. This protection by phospholipase A was reversible within 1 hr after removal of the enzyme by washing. Both protein and lipid structures appear to be involved in the recognition of phalloidin on the surface of liver cells.

0592 PORTAL HYPERTENSION WITHOUT HEPATIC CIRRHOSIS IN CHRONIC VITAMIN A INTOXICATION. (Ger.)
Kistler, H. J.; Pluer, S.; Dickenmann, W.; Pirozynski, W. (Medizinische Abteilung, Spital Limmattal, CH-8952 Schlieren, Switzerland). *Schweiz. Med. Wochenschr.* 107(24):825-832; 1977.

Chronic vitamin A intoxication developed in a 37-yr-old man with psoriasis vulgaris following intake of vitamin A (700,000 IU/day, p.o.) for 13 months. Initially, the psoriatic lesions cleared, but skin symptoms returned with further intake of vitamin A. The patient developed symptoms typical of chronic vitamin A intoxication; these included deterioration in his general condition, total alopecia, anorexia, weight loss, ascites, edema of the legs, and depression. The patient had abnormal liver function tests and hepatomegaly. Splenoportography revealed portal hypertension. No signs of liver cirrhosis were demonstrated by repeated liver biopsies. The patient improved gradually after discontinuation of vitamin A. Hair growth was evident, and skin lesions were cured with local therapy. Ascites and edema receded following treatment with spirolactone, ethacrynic acid, and furosemide. The patient was also given a tricyclic antidepressant. Serum vitamin A levels decreased after 3 months, and liver function tests gradually returned to normal; signs of portal hypertension completely disappeared. BSP retention returned to normal after 2 yr.

0593 GLUCOSE-DEPENDENT HEPATIC MEMBRANE TRANSPORT IN NONBACTEREMIC AND BACTEREMIC THERMALLY INJURED PATIENTS. (Eng.) McDougal, W. S.; Wilmore, D. W.; Pruitt, B. A., Jr. (Brooke Army Medical Center, Fort Sam Houston, TX 78234). *J. Surg. Res.* 22(6):697-708; 1977.

Hepatic clearance of indocyanine green (ICG) was measured in 106 studies in 25 thermally injured patients, and the effect of bacteremia and various infused substrates on hepatic dye uptake is described. The patients (mean age, 35 yr) had an average total body surface burn of 59%. Seventeen patients subsequently developed positive blood cultures and were restudied. Fourteen serial measurements of dye concentration taken over a 70-min period were computer fitted to describe each disappearance curve, and the two rate constants, k_1, and k_2, were determined (all $r^2>0.94$). ICG plasma disappearance was unimpaired in nonbacteremic patients when glucose or glucose plus amino acids were part of the parenteral regimen ($-k_1=0.241 \pm 0.023$ and 0.255 ± 0.009/min) but were significantly decreased when near isocaloric amounts of glucose-free amino acid solutions were administered ($-k_1=0.150 \pm 0.016$/min, $p<0.001$). Bacteremic patients had markedly impaired ICG hepatic clearance, irrespective of the hypocaloric dietary regimen. Both exclusion of glucose from the nutrient infusates in nonbacteremic patients and bacteremia resulted in a marked reduction in the maximal velocity of the ICG dye transport reaction. Septic patients infused with glucose and insulin improved their clearance of the dye (from $k_1=0.169 \pm 0.029$ to 0.183 ± 0.028/min, $p<0.01$). These alterations could not be related to changes in circulation or perfusion. Urea production varied inversely and endogenous insulin levels directly with the k_1, suggesting that membrane transport is related to the ornithine cycle and/or is influenced by insulin. Optimal metabolic integrity of the hepatocyte is substrate-specific and dependent upon the provision of exogenous energy. Hepatic transport function is limited in bacteremic patients, as well as in burn patients deprived of glucose. Restoration of hepatic transport processes may be achieved by providing sufficient energy in the form of glucose.

0594 Campylobacter fetus: SEPTICEMIA AND HEPATITIS IN A CHILD WITH AGAMMAGLOBULINEMIA. (Eng.) Wyatt, R. A.; Younoszai, K.; Anuras, S.; Myers, M. G. (Univ. Iowa Hosp., Iowa City, IA 52242). *J. Pediatr.* 91(3):441-442; 1977.

0595 DEXTROPROPOXYPHENE AND JAUNDICE. (Eng.)
Ford, M. J.; Kellett, R. J.; Busuttil, A.; Finlayson, N. D. C. (Eastern General Hosp., Edinburgh, Scotland). *Br. Med. J.* 2(6088):674; 1977.

0596 DRUG-INDUCED CHRONIC LIVER DISEASE. (Eng.)
Maddrey, W. C.; Boitnott, J. K. (Johns Hopkins Hosp., 601 N. Broadway, Baltimore, MD 21205). *Gastroenterology* 72(6):1348-1353; 1977.

0597 HALOTHANE HEPATITIS: CASE REPORT. (Eng.)
Huffman, T. L.; Wilkinson, E. A. (427 Cahill Rd., Branson, MO 64730). *Mo. Med.* 74(6):261-263; 1977.

Acute Viral Hepatitis

0598 A CRITIQUE OF INTERNATIONAL ASSOCIATION FOR THE STUDY OF THE LIVER (IASL) CRITERIA FOR THE DIAGNOSIS AND TREATMENT OF VIRAL HEPATITIS.

(Eng.) Leevy, C. M. (Coll. Medicine and Dentistry of New Jersey, Newark, NJ 07103). *Rush. Presbyterian-St. Lukes Med. Bull.* 15(2):115-122; 1976.

Criteria established by the International Association for the Study of the Liver (IASL) for the diagnosis of viral hepatitis are critically reviewed. A major diagnostic problem relates to the occurrence of hepatitis due to a virus other than the A or B type. This new form of hepatitis, labeled virus C type, is particularly difficult to differentiate from drug-induced hepatitis. Differentiation of alcoholic hepatitis from viral hepatitis has been facilitated by the detection in serum of an antigen to alcoholic hyalin in early phases of the disease followed by the appearance of antibodies to this glycoprotein, which has been isolated and partially purified. Criteria for chronic and fulminant viral hepatitis do not reflect the prognostic implications of these diseases. There is a need to supplement IASL criteria with information on hepatocyte volume, regenerative capacity, and other factors to properly classify patients with fulminant hepatitis. Diagnostic criteria for chronic persistent and chronic active hepatitis are primarily based on histology; serial biopsies and clinical features compatible with either disease may show lesions of the other disease, owing to sampling or a change in status. Clinical tests for evaluating patients with viral hepatitis have been established on three increasingly sophisticated levels, depending on the medical test facilities available. Level I tests include measuring amino transferase activities, serum protein levels, prothrombin time, dye retention, serum bilirubin level and fractionation, and serum alkaline phosphatase activity, plus liver biopsy, and detection of virus B surface antigen and antibody via immunodiffusion, counter immunoelectrophoresis, and inert particle agglutination. Level II tests include measurements of indocyanine green clearance, serum 5' nucleotidase activity, serum bile acid levels, serum immunoglobulin levels, and alpha fetoprotein level, plus hepatitis B surface antigen and antibody detection by complement fixation, radioimmunoassay, and electron microscopy. Level III tests include measurements of galactose elimination capacity, bile acid clearance, lymphocyte response to hepatitis B surface antigen, hepatitis B core and hepatitis B core antibody detection, and the detection of hepatitis A virus by complement fixation, immune adherence test, and fecal viral particles.

0599 THE SIGNIFICANCE OF THE DIAGNOSIS OF ISOENZYMES IN LIVER DISEASES. 2ND COMMUNICATION: ACUTE HEPATITIS AND ITS COURSE.

(Ger.) Graubaum, H. J.; Wagenknecht, C.; Klimmt, G.; Baumgarten, R.; Schneider, G.; Schimmelpfennig, W.; *et al.* (Institut Physiologische Biologische Chemie der Humboldt-Universitat, DDR-104 Berlin, Hessische Str. 3/4, E. Germany). *Dtsch. Gesundheitsw.* 32(23): 1087-1092; 1977.

Plasma isoenzyme levels, including glutamate dehydrogenase (GOT), aldolase dehydrogenase (ALD), and LDH were determined in 59 patients with acute hepatitis and correlated with the severity, stage, and prognosis of the disease. Marked increases of total ALD, GOT, and LDH were noted shortly after the appearance of the first prodromal symptoms in the first week. In uncomplicated cases of acute hepatitis, M-type LDH levels returned to normal after 2-3 weeks, liver ALD (ALD-L) and GOT-M after 3 weeks and cytoplasmic GOT (GOT-C) after 5 weeks. H-type LDH increased up to the fifth week. High activities of ALD-L, GOT-C, and M-type LDH and a high level of GOT-M were found to indicate severe cellular damage. Normal activities of ALD-L, GOT-M, and M-type LDH with raised GOT-C demonstrate a normalization of hepatitis (late phase), whereas increases in ALD-L, GOT-C, and M-type LDH above normal indicate the early stage. Elevated enzyme levels beyond the eighth week reflect a protracted course, which may be the start of chronic hepatitis. Following a 2-week course of treatment of one patient with prednisolone (1 mg/kg/day), plasma enzyme levels decreased, whereas the specific activity of the isoenzymes in the liver and plasma, excluding H-type LDH, returned to normal. The decrease of the activities in plasma has repeatedly been attributed to a membrane-stabilizing effect of prednisolone, which does not occur in the liver. Bicycle ergometer tests of five patients with prior hepatitis showed low or constant isoenzyme levels after exertion, whereas all eight controls had elevated isoenzyme levels. These results suggest that isoenzymes are eliminated more rapidly in the former group but more tests are needed to corroborate these findings.

0600 STUDIES OF AN OUTBREAK OF ACUTE HEPATITIS A: I. COMPLEMENT LEVEL FLUCTUATION.

(Eng.) Baer, G. M.; Walker, J. A.; Yager, P. A. (P.O. Box 363, Lawrenceville, GA 30246). *J. Med. Virol.* 1(1): 1-7; 1977.

Serum samples from 50 patients who were involved in a hepatitis A outbreak were examined for complement levels and for the presence of antigen-antibody complexes. The outbreak was caused by sewage-contaminated drinking water and involved 49 children and 1 adult. Acute and convalescent serum samples were obtained from the hepatitis patients, and from each of 24 unafflicted matched controls at the same time. Strikingly, the levels of the third and fourth components of complement (C'3 and C'4) were markedly reduced in the acute samples from the sick children but returned to normal in the convalescent ones; the C'3 and C'4 levels in the healthy matched controls were not reduced. In addition, antigen-antibody complexes were found in convalescent sera from some of the sick children. These findings indicate that immune complexes are present in acute hepatitis A and suggest that the techniques for future virus isolation may have to be altered.

0601 HEPATITIS B: NEW ASPECTS, PRACTICAL CONSEQUENCES, VIROLOGY AND EPIDEMIOLOGY.

(Ger.) Deinhardt, F. (Max von Pettenkofer-Institut, Pettenkoferstrasse 9a, D-8000 Munchen 2, W. Germany). *Schweiz. Med. Wochenschr.* 107(15):505-510; 1977.

The epidemiology, virology, serology, and immunization against viral hepatitis are discussed. In addition to the identification and characterization of hepatitis A and B, a third form ("non A-non B" hepatitis) has been recognized. Primary hepatitis is distinct from secondary hepatitis, which frequently is an accompanying symptom of primary infections with Epstein-Barr virus, as seen in infectious mononucleosis. Hepatitis A (short incubation hepatitis) usually occurs as an epidemic and has an incubation time of 20-30 days; it can be prevented or weakened by normal human immune serum globulin (ISG). Hepatitis B (long incubation hepatitis) frequently develops after blood transfusions and is transmitted by blood products and inadequately sterilized instruments or by direct human contact. Perinatal transmission is also possible in children born to mothers who have acute hepatitis B during the last trimester of pregnancy. The incubation time of hepatitis B ranges from 50 to 90 days. Vaccination with a special hepatitis B surface antigen (HBsAg)-ISG (having anti-HBsAg titers of 1:200,000 to 1:500,000 during passive hemagglutination) offers promising protection. Non A-non B hepatitis probably is the most frequent form of post-transfusion hepatitis with an unclear incubation time. There is no cross-immunity between this latter form and he other two. HBsAg is important for the serological diagnosis of hepatitis B; it usually appears in the serum 2-8 weeks prior to the development of clinical symptoms and generally persists for 2-21 weeks. On the other hand, the other components hepatitis B core antigen (HBcAg), e antigen, and virus DNA polymerase can be found temporarily uring the time of active virus multiplication. ersistent e antigenemia is found in the severe and ctive-chronic forms of transient disease and is lways accompanied by Dane particles and DNA poly- erase, which are indicative of an active process n the liver. Recent trials with vaccines from ubunits of HBsAg show promise for controlling epatitis B by active immunization, but caution is arranted due to the many prevailing difficulties.

602 MODIFICATIONS OF CHRONIC HEPATITIS-B VIRUS INFECTION IN CHIMPANZEES BY ADMINISTRATION F AN INTERFERON INDUCER.

(Eng.) Purcell, R. H.; ondon, W. T.; McAuliffe, V. J.; Palmer, A. E.; aplan, P. M.; Gerin, J. L.; *et al.* (Natl. Inst. Allergy and Infectious Diseases, Natl. Inst. Health, Bethesda, MD 20014). *Lancet* 2(7989):757-761; 1976.

Chimpanzees chronically infected with hepatitis B virus were treated with the interferon inducer polyriboinosinic-polyribocytidylic acid-poly-l-lysine carboxymethyl cellulose (PICLC). In two separate experiments, the animals received PICLC (3 mg/kg, i.v.) either once daily for 7 days and every other day for an additional week or once daily for two 6-day periods separated by one non-treatment day, and every other day thereafter for 7 weeks. Serum Dane particle-associated DNA polymerase, e antigen, hepatitis B surface antigen, and intrahepatic hepatitis B surface and core antigens diminished during both treatments. Defective (DNA polymerase-negative) Dane particles increased in titer transiently during treatment; these may play a role in the modulation of hepatitis B virus infection. Humoral immune responses in chronic hepatitis B carrier chimps were unaffected. Interferon inducers (or exogenous interferon) may be useful for the treatment of chronic hepatitis B virus infection.

0603 CLINICAL SIGNIFICANCE OF HEPATITIS B ANTIGEN AND OF HEPATITIS B ANTIBODY.

(Ger.) Renger, F.; Frank, K. H.; Reimann, W.; Tschopel, L.; Muller, Ch. (Medizinische Klinik, Medizinische Akademie "Carl Gustav Carus," Fetscherstrasse 74, DDR-8019 Dresden, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):121-122; 1976.

The general clinical aspects of hepatitis B antigen (HBAg) and hepatitis B antibody are reviewed. The incidence of carriers of hepatitis B virus is 0.1-20% worldwide. This virus can be transmitted parenterally and orally. HBAg may be present in various body fluids, such as blood, colostrum, sperm, menstrual blood, and feces. The induction of hepatitis is dependent on incubation time, dose inoculated, and the susceptibility of the recipient. The incidence of serum hepatitis can be reduced substantially by weeding out HBAg-positive blood donors and by using blood from one donor instead of pooled blood.

0604 SIMULTANEOUS PRESENCE OF HBsAg AND ANTI-HBs IN THE SERUM OF DIFFERENT SUBTYPES (SEROLOGICAL AND IMMUNOFLUORESCENT STUDIES).

(Eng.) Hess, G.; Arnold, W.; Koesters, W.; Biswas, R.; Hutteroth, T. H.; Meyer zum Buschenfelde, K. H. (Freie Universitat Berlin, Klinikum Charlottenburg, 1000 Berlin 19, W. Germany). *Z. Immunitaetsforsch.* 153(2):143-151; 1977.

Three patients with chronic renal insufficiency who were on hemodialysis and receiving blood transfusions were studied both serologically and by direct and indirect immunofluorescence for the presence of various hepatitis B virus antigens and antibodies. Serum factors were measured by immunodiffusion, counter-immunoelectrophoresis, passive hemagglutination, and/or radioimmunoassay. Liver biopsy revealed two cases of chronic persistent hepatitis and one case of mild chronic active hepatitis. The two women showed the HBsAg subtype *ad* and anti-HBs with the *y* specificity, while the men carried the HBsAg subtype *ay* and anti-HBs with specificity *d*. No antibody with specificity *a* was found in any serum. Using the Raji-cell technique, no circulating complement binding immune complexes were found. Measurements of rheumatoid factor, antimitochondrial antibodies, smooth muscle antibodies, and antinuclear antibodies were negative, except for the latter in one woman (homogeneous type, 1:10 dilution). All sera were positive for e-antigen and negative for anti-e. One woman was followed for 8 months and persistently carried the HBsAg subtype *ad*; after 4 months she also produced anti-HBs with *y* specificity. Liver biopsy slices tested with subtype-specific antisera showed cytoplasmic fluorescence in all cases with anti-HBs subtypes *ad* and *ay*, while nuclear fluorescence was noted with anti-HBc in two cases. In these two cases positive reaction with anti-human IgG was found in the nuclei but not in the cytoplasm. Indirect immunofluorescence with subtype-specific antisera demonstrated a cytoplasmic fluorescence with anti-HBs subtypes *ad* and *ay* in all patients. Liver sections were positive with HBs antibodies to subtype *d* in two patients (who carried subtype *ad* in their sera) and to the subtype *y* in one patient (who carried *ay* in his serum). Autologous serum produced no fluorescence on liver sections, whereas two patients' sera produced a cytoplasmic reaction on liver slices of the third patient and vice versa. It is suggested that the occurrence of HBsAg and anti-HBs with different subtypes in a single patient may be due to two exposures to hepatitis B viruses of different subtypes, one exposure producing an immune tolerance and another an immune response. Chronic renal insufficiency has been demonstrated to produce an impaired immune competence and might be involved in a differential response to HBsAg subtypes.

0605 CORRELATIONS BETWEEN ANTI-ALBUMIN ANTIBODIES AND HBsAG IN HEPATIC PATIENTS.

(Eng.) Lenkei, R.; Babes, V. T.; Dan, M. E.; Mustea, A.; Dobre, I. (Victor Babes Inst., Spl. Independentei 99-1-1, Bucharest 35, 7000 Rumania). *J. Med. Virol.* 1(1):29-34; 1977.

Sera from patients with various hepatic disorders and from healthy controls were examined for the presence of hepatitis B surface antigen (HBsAg) and the incidence and titer of antipolymerized albumin antibodies (AAA). HBsAg detection was done by counterelectrophoresis (CEP) and by reversed passive hemagglutination (RPH). AAA detection was done by immunodiffusion with glutaraldehyde-polymerized human serum albumin (ID-HSA) and by passive hemagglutination (HA-EPA). The incidences of HBsAg in 360 controls, 21 patients with chronic persistent hepatitis, 220 patients with acute viral hepatitis, 64 patients with chronic aggressive hepatitis, and 74 patients with hepatic cirrhosis were 12.8, 52.4, 28.2, 68.8, and 52.7%, resp. The incidences of AAA in these groups were 17.8, 14.3, 69.5, 64.1, and 70.3%, resp., as measured by ID-HSA and 13.9, 33.3, 56.4, 50.0, and 43.2%, resp., as measured by HA-EPA. The AAA concentrations (μg/ml) in these groups were 1,058.3 ± 41.9, 1,075.1 ± 201.2, 479.2 ± 67.6, 504.3 ± 142.4, and 441.3 ± 127.0, resp., as measured by ID-HSA. The AAA titers (log$_2$) for these groups were 4.3 ± 0.2, 6.5 ± 0.8, 7.0 ± 0.4, 6.4 ± 0.5, and 6.4 ± 0.5, resp., as measured by HA-EPA. The incidence of AAA in ID-HSA did not correlate with HBsAg in any of these groups, but the frequency and titer of HA-EPA were higher in patients with HBsAg in each group, though the difference did not reach statistical significance. There was a significant linear correlation between HBsAg, as measured by RPH, and ID-HSA AAA agglutinins ($r=0.15$, $p<0.001$) and HA-EPA AAA precipitins ($r=0.30$, $p<0.001$). By indirect immunofluorescence, eight sera from patients with acute viral hepatitis and three sera from chronic hepatitis patients (negative in CEP and RPH for HBsAg and with high titers in HA-EPA for AAA) were tested for anti-hepatitis B core antibodies (anti-HBc). In eight cases, a bright fluorescence was obtained in the same nuclei as those revealed by standard positive sera. No fluorescence was obtained by the direct application of sheep anti-human immunoglobulin serum labeled with fluorescein isothiocyanate or by other sera from normal subjects previously tested for HBsAg by RPH and for anti-HBc by indirect immunofluorescence. The results indicate that indirect immunofluorescence for the detection of anti-HBc is more sensitive than RPH in the diagnosis of a recent or ongoing hepatitis B virus infection.

0606 HBsAg and HBcAg IN THE LIVERS OF ASYMPTOMATIC HEPATITIS B ANTIGEN CARRIERS. (Eng.)

Tapp, E.; Jones, D. M. (Preston Royal Infirmary, Preston, England). *J. Clin. Pathol.* 30(7):671-677; 1977.

Liver sections from 33 asymptomatic blood donors (22 of whom had multiple biopsies) with constant hepatitis B surface antigen (HBsAg) antigenemia were studied by immunoperoxidase and orcein staining and by electron microscopy. With immunoperoxidase, HBsAg was noted in the liver cell cytoplasm of 34/48 biopsies; 12/33 carriers were negative. Staining varied from a small part of the cell to the entire cell with an intensity from pale yellow to dark brown. A foamy cytoplasm indicated unstained lipid droplets. There was no indication HBsAg was confined to cellular margins. Sheets of cells with diffuse staining affecting up to two-thirds of the lobule were seen while another group of cells could be discerned in which considerably fewer cells were stained. The diffuse pattern was frequent in livers with focal parenchymal necrosis and was seen in two-thirds of biopsies showing cirrhosis. Focal staining was commonly found in cases of chronic aggressive hepatitis. Chronic persistent hepatitis showed both patterns of staining with equal frequency. Subsequent biopsies indicated no change in pattern, with about half the carriers in each group showing some histological deterioration; however, only 1/10 follow-up biopsies showed deterioration in carriers negative for HBsAg. Only 8 (from 4 donors) of 48 biopsies were positive for hepatitis B core antigen (HBcAg) in hepatocyte nuclei, with immunoperoxidase staining varying from a brown to black color. Orcein, reactive for HBsAg, stained only about half the biopsies positive with immunoperoxidase. With electron microscopy, filaments and tubules were observed within dilated endoplasmic reticulum. In 6 (from 3 donors) of 37 biopsies, 20-nm particles were found in the cell nuclei, and those biopsies were all positive with the HBcAg immunoperoxidase procedure. The results indicate that the immunoperoxidase technique is more sensitive than the orcein procedure, that there is an inverse relationship between the content of HBsAg in the cytoplasm and the degree of liver cell destruction, and that HBcAg occurs only in the liver cell nuclei of individuals with chronic hepatitis of the aggressive or persistent type.

0607 e-SYSTEM AND INTRAHEPATOCELLULAR HBcAG AND HBsAG IN HBsAG POSITIVE PATIENTS WITH LIVER DISEASES AND HEALTHY CARRIERS. (Eng.) Hess, G.; Nielsen, J. O.; Arnold, W.; Meyer zum Buschenfelde, K. H. (Second Dept. Internal Medicine, Univ. Mainz, Mainz, W. Germany). *Scand. J. Gastroenterol.* 12(3): 325-330; 1977.

To investigate the prognostic value of the e antigen and the importance of the e antigen as a sign of infectivity, patients with hepatitis B surface antigen (HBsAg)-positive liver diseases and healthy carriers were studied for the presence of e antigen and antibody (anti-e) as well as for intrahepatocellular HBsAg and hepatitis B core antigen (HBcAg). The e antigen was demonstrated in 9 of 12 patients with chronic persistent hepatitis, in 15 of 39 patients with chronic active hepatitis, in 3 of 40 patients with acute type B hepatitis, and in 2 of 9 patients with a protracted course of type B hepatitis. No e antigen was found in healthy HBsAg carriers in patients with complete recovery from type B hepatitis 1 yr after the onset of the disease. Anti-e was detected in 24 of 61 healthy HBsAg carriers with a normal liver histology and in one patient with a mild form of a chronic persistent hepatitis. The presence of e antigen in serum was associated with the presence of HBcAg in the nuclei of the liver cells. Twenty-seven of 29 e-positive patients had HBcAg in the liver cell nuclei. In contrast, none of 20 patients with anti-e in the serum had HBcAg in the liver cells. The results support the hypothesis that the sera of healthy HBsAg carriers are not infectious.

0608 DISCORDANT e ANTIGEN, DNA POLYMERASE ACTIVITY, AND DANE PARTICLE RESPONSES IN TWO PATIENTS REPRESENTING AN INDEX CASE-CONTACT CASE PAIR WITH HEPATITIS B VIRUS INFECTION. (Eng.) Perrillo, R. P.; Gelb, L. D.; Milligan, W. H., III; Wellinghoff, W.; Aach, R. D. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *J. Infect. Dis.* 136(1):117-121; 1977.

Sera from an index case-contact case pair with hepatitis B virus infection were examined for the presence of e antigen and antibody to e antigen (anti-e), as well as for DNA polymerase activity and the frequency of Dane particles. The index case was a 30-yr-old physician who had no known history of exposure, but who developed acute viral hepatitis. Six months later, chronic aggressive hepatitis was noted. Two months after the onset of illness in the first patient, his wife, who had no known contact other than her husband, developed anicteric, acute viral hepatitis. Six months later, biopsy revealed chronic aggressive hepatitis. Sera from the index patient were consistently e-antigen negative during the 12-month study period, while sera from the contact patient were e-antigen positive during the same period. The contact patient's sera demonstrated an e antigen/anti-e precipitin line at a serum concentration of 1:16 while sera from the index patient failed to manifest this line, even at a threefold concentration of serum. Sera from both patients were positive for hepatitis B surface antigen (HBsAg) during the entire test period, and neither patient had detectable anti-e or antibody to HBsAg. Sera from three healthy persons and from two HBsAg-negative patients were used as controls for the detection of Dane particles and DNA polymerase activity. None of the controls demonstrated any Dane particles, while the index case had between one and five particles per field, and his wife had over 16 particles per field. The DNA polymerase activity of the index patient did not differ from that of controls, while that of the contact patient was unusually high (2,570 counts/min). Sera of both patients appeared to be of the HBsAg subtype *adw*. These responses demonstrate that there is a lack of correlation between the presence of e antigen and the viral strain, and they strengthen the relationship of the e antigen to persistent viremia. The role of the host, rather than that of the infective agent, in the expression of the hepatitis B antigen is emphasized.

0609 HOST RESPONSES TO HEPATITIS B INFECTION IN PATIENTS IN A CHRONIC HEMODIALYSIS UNIT. (Eng.) London, W. T.; Drew, J. S.; Lustbader, E. D.; Werner, B. G.; Blumberg, B. S. (Inst. Cancer Res., 7701 Burholme Ave., Philadelphia, PA 19111). *Kidney Int.* 12(1):51-58; 1977.

To study the nature and variation of hepatitis B infection in patients undergoing chronic hemodialysis, host responses to hepatitis B infection were studied in 222 patients in a chronic hemodialysis unit. From 1970 to 1976, patients were monitored monthly for development of hepatitis B surface antigen (HBsAg), antibody to HBsAg (anti-HBs), and SGPT elevations. Five categories of patients were identified: (1) chronic carriers of HBsAg, (2) transiently HBsAg(+), who developed anti-HBs, (3) HBsAg(-) on admission, who developed anti-HBs without becoming HBsAg(+), (4) anti-HBs(+) on admission, and (5) uninfected, who remained HBsAg(-) and anti-HBs(-). For patients who became HBsAg(+), the probability of becoming a chronic carrier was

62.8% and rose to 88.5% if they had been HBsAg(+) for 5 consecutive months. Men were more likely to become chronic carriers, and women were more likely to develop anti-HBs. Neither age, race, nor type of underlying kidney disease was associated with particular host responses to hepatitis B virus. No effect of hepatitis B infection on mortality was detected. Variation in host response to hepatitis B infection among renal dialysis patients may affect the usefulness of hepatitis B hyperimmune globulin and hepatitis B vaccine and may be related to the outcome of kidney transplantation.

0610 THE EFFECT OF INTRADERMAL ADMINISTRATION OF Corneybacterium parvum ON THE IMMUNE RESPONSE TO HEPATITIS Bs ANTIGEN. (Eng.) Papaevangelou, G.; Sparros, L.; Vissoulis, C.; Kyriakidou, A.; Giokas, G.; Hadzimanolis, J.; *et al.* (Univ. Athens, Medical Sch., Athens 609, Greece). *J. Med. Virol.* 1(1):15-19; 1977.

Because the persistence of hepatitis B surface antigen (HBsAg) in asymptomatic chronic carriers for years or for life has been attributed to a specific defect in the immune response to HBsAg, the immunopotentiating effect of the intradermal administratio of a course of four doses (0.25 ml) of a standard suspension of killed *Corynebacterium parvum* (2 mg/ml) was studied in 10 asymptomatic chronic HBsAg carriers, in 11 persons with antibodies to HBsAg (anti-HBs), and in 6 persons without HBsAg or anti-HBs. HBsAg, anti-HBs, and leukocyte migration inhibition (LMI) studies were performed in pre- and postinoculation blood samples. *C. parvum* produced a substantial increase of anti-HBs titer in subjects with preexisting anti-HBs. However, anti-HBs responses were not induced in carriers. HBsAg was not eliminated, and its titer remained practically unchanged in carriers. These results support the hypothesis that in carriers the specific defect in the immune response to HBsAg possibly exists at the B cell level.

0611 NECROSIS OF THE HEPATOCYTES WITH HEPATITI B SURFACE ANTIGEN: OCCURRENCE IN A CHRON HEPATITIS B SURFACE ANTIGEN CARRIER. (Eng.) Karasawa, T.; Shikata, T. (Faculty Medicine, Univ. Toky Tokyo, Japan) *Arch. Pathol. Lab. Med.* 101(6):280-285; 1977.

Light and electron microscopy of a liver specimen from a 25-yr-old man who was an asymptomatic chronic hepatitis B surface antigen (HBsAg) carrier for at least 1 yr and 8 months are reported. No anti-HBsAg was demonstrated in the serum of this patient. The microscopic findings revealed small lymphocytes and macrophages in close contact with liver cells, partial hepatocyte cytolysis of varying degrees, lytic hepatocyte necrosis, and the complete loss of a few hepatocyte with HBsAg in the cytoplasm. HBsAg or HBsAg-associated material in the cytoplasm was found only in either necrotic liver cells or in liver cells with ground glass appearing cytoplasm. Conventional immunofluorescence studies revealed HBsAg not only in the cytoplasm of hepatocytes but also on the cell membrane. Only hepatocytes with HBsAg both in the cytoplasm and on the cell membrane were necrotic. No IgG or IgM was detected on the cell membrane of the liver cells or in the necrotic foci. Complement component 3 was not present in the necrotic foci. The above evidence most likely rules out not only the involvement of cytotoxic antibody- and complex-mediated humoral immune responses but also that of antibody-directed cell-mediated cytotoxicity or of a cytotoxic mechanism whereby nonspecific normal lymphoid cells (supposedly either bone marrow-derived lymphocytes or macrophages) destroy target cells coated with antibody molecules. Thus, the liver cell injury in this case was probably due to specific contact of hepatocytes with killer cells which are immunologically activated thymus-derived lymphocytes (contact killing).

0612 PERIPHERAL BLOOD AND LIVER TISSUE T AND B LYMPHOCYTES AND HEPATITIS B VIRUS (HBV) [Letter to Editor]. (Eng.) Miller, D. J.; Dwyer, J. M.; Klatskin, G. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *Gastroenterology* 74(1):160-161; 1978.

0613 A CLINICOPATHOLOGIC STUDY OF FULMINANT HEPATITIS [Abstract]. (Eng.) Arakawa, Y.; Fujita, S. (Nihon Univ. Sch. Medicine, Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):326; 1977.

0614 COMPLEMENT IN FULMINANT HEPATITIS [Abstract]. (Eng.) Kondo, M.; Torisu, M. (Kyoto Prefectural Univ. Medicine, Kyoto, Japan). *Gastroenterol. Jpn.* 12(4):329; 1977.

0615 PLASMA EXCHANGE USING CELLTRIFUGE IN PATIENT WITH FULMINANT HEPATITIS [Abstract]. (Eng.) Iwanaga, T.; Horiuchi, A. (Kinki Univ. Sch. Medicine, Osaka, Japan). *Gastroenterol. Jpn.* 12(4):329; 1977.

0616 THE MEASUREMENT OF SERUM PROTEINS WITH RAPID TURNOVER FOR EARLY DIAGNOSIS OF FATAL HEPATITIS [Abstract]. (Eng.) Kobayashi, K.; Kameda, S.; Hattori, N. (Sch. Medicine, Kanazawa Univ., Kanazawa, Japan). *Gastroenterol. Jpn.* 12(4):328; 1977.

0617 CHARCOAL HEMOPERFUSION FOR THE TREATMENT OF FULMINANT HEPATITIS [Abstract]. (Eng.) Amano, I.; Kano, H. (Chukyo Hosp., Nagoya, Japan). *Gastroenterol. Jpn.* 12(4):327; 1977.

0618 TREATMENT OF FULMINANT HEPATITIS BY NEW ARTIFICIAL LIVER SUPPORT SYSTEM (PLASMA PERFUSION DETOXIFICATION) [Abstract]. (Eng.) Inoue, N.; Sakai, T. (Oji Natl. Hosp., Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):328; 1977.

0619 BACKGROUND AND PRACTICAL ASPECTS OF HEPA-
TITIS B SURFACE ANTIGEN CARRIER STATE.
(Eng.) Helske, T. (Finnish Red Cross Blood Trans-
usion Service, Helsinki, Finland). *Ann. Clin. Res.*
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620 DETECTION OF HEPATITIS B ANTIGEN IN BLOOD
DONORS BY RADIOIMMUNOASSAY AND 3 REVERSE
ASSIVE HAEMAGGLUTINATION TECHNIQUES. (Eng.)
eidl, S.; Ziegler, G. B. (Inst. Immunohematology,
niv. Frankfurt/M., Frankfurt, W. Germany). *Vox.*
ang. 31(2):81-86; 1976.

621 THE PREVENTION OF VIRAL HEPATITIS. (Eng.)
Krugman, S. (New York Univ. Medical Center,
ew York, NY). *Ann. Clin. Res.* 8(3):216-220; 1976.

622 THE LONG TERM OUTCOME OF HEPATITIS B.
(Eng.) Norkrans, G.; Hermodsson, S.;
undin, P.; Iwarson, S. (Dept. Infectious Diseases,
niv. Goteborg, Goteborg, Sweden). *Infection* 4(2):
0-72; 1976.

623 HEPATITIS B ANTIGEN AND SYSTEMIC LUPUS
ERYTHEMATOSUS. FALSE POSITIVE COMPLEMENT
IXATION DUE TO ANTI ANTIBODIES. (Eng.) Celada,
.; Nydegger, U. E.; Lambert, P. H.; Miescher, P.
. (Hop. Cant., Geneva, Switzerland). *Klin. Wochen-*
hr. 54(7):303-307; 1976.

24 STUDY OF INTEROBSERVER VARIATION BETWEEN
LIVER HISTOPATHOLOGISTS [Abstract].
ng.) Theodossi, A.; Knill-Jones, R. P.; Silk,
B. A.; Williams, R. (King's Coll. Hosp., Den-
rk Hill, London, England). *Gut* 18(11):A953;
77.

25 EPIDEMIOLOGICAL STUDY OF NEONATAL HEPATITIS
SYNDROME IN INFANCY: INCIDENCE AND EARLY
URSE [Abstract]. (Eng.) Mowat, A. P.; Psacharo-
ulos, H.; Williams, R. (King's Coll. Hosp. Medical
h., London, England). *Gut* 18(11):A977; 1977.

26 MOTHER-TO-INFANT TRANSMISSION OF HEPATITIS
B VIRUS [Abstract]. (Eng.) Tarlow, M. J.;
rso, A.; Boxall, E. H.; Flewett, T. H. (East Bir-
ngham Hosp., Birmingham, England). *Gut* 18(11):
64; 1977.

27 LEVAMISOLE IN THE TREATMENT OF HBs ANTIGEN
POSITIVE CHRONIC ACTIVE LIVER DISEASE [Ab-
ract]. (Eng.) Chadwick, R. G.; Jain, S.; Thomas,
C.; Sherlock, S. (Royal Free Hosp., London, Eng-
d). *Gut* 18(11):A979; 1977.

8 HEPATITIS B: ABSENCE OF TRANSMISSION BY
GASTROINTESTINAL ENDOSCOPY [Abstract].
g.) McClelland, D. B. L.; Burrell, C. J.; Tonkin, R. W.; Heading, R. C. (Dept. Therapeutics, Univ. Edinburgh, Edinburgh, Scotland). *Gut* 18(11): A968; 1977.

0629 MICROSOMAL DRUG OXIDASES IN LIVER DISEASE AND AFTER CHRONIC DRUG INGESTION IN MAN [Abstract]. (Eng.) Farrell, G. C.; Cooksley, W. G. E.; Powell, L. W. (Dept. Medicine, Univ. Queensland, Brisbane, Australia). *Gastroenterology* 73(5):1219; 1977.

0630 HEPATITIS B 'e' ANTIGEN: AN ASSOCIATION WITH LACTATE DEHYDROGENASE ISOZYME-5 [Abstract]. (Eng.) Vyas, G. N.; Peterson, D. L.; Townsend, R. M.; Damle, S. R.; Magnius, L. O. (Dept. Lab. Medicine, Univ. California, San Francisco, CA). *Gastroenterology* 73(5):1253; 1977.

0631 INTRAHEPATIC LOCALIZATION OF THE SURFACE (HBsAg) AND CORE (HBcAg) ANTIGENIC DETERMINANTS ASSOCIATED WITH HEPATITIS B VIRUS IN BIOPSY SAMPLES FROM PATIENTS WITH LIVER DISEASE. (Eng.) Rizzetto, M.; Crivelli, O.; Suriani, R.; Verme, G. (Osp. Mauriziano Umberto I, Torino, Italy). *Ric. Clin. Lab.* 6(1):41-54; 1976.

0632 HEPATITIS B VIRUS IN NUCLEOLI OF LIVER CELLS [Letter to Editor]. (Eng.) Michalak, T.; Nowoslawski, A. (Natl. Inst. Hygiene, 00-791 Warsaw, Poland). *N. Engl. J. Med.* 297(14): 787-788; 1977.

0633 TYPE A VIRAL HEPATITIS AND ITS IMPORTANCE IN HYGIENIC MEASURES IN THE SURROUNDING ENVIRONMENT. (Rum.) Romanescu, Gh.(Laboratorul de epidemiologie al Sectiei pentru controlul de stat al serurilor si vaccinurilor, Bucharest, Rumania). *Rev. Ig. [Bacteriol.]* 26(2):109-112; 1977.

0634 INITIAL EXPERIENCE WITH THE APPLICATION OF THE HEMOSORPTION METHOD IN THE TREATMENT OF CHILDREN WITH HEPATIC INSUFFICIENCY. (Rus.) Burkov, I. V.; Osipov, Yu. N.; Mosharov, O. P.; Uchaikin, V. F.; Troitsky, A. A. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (6):52-57; 1977.

See also, 0538, 0551, 0567, 0575, 0637, 0638, 0673.

Chronic Hepatitis

0635 LIVER BIOPSY IN HEMOPHILIA A. (Eng.)

Lesesne, H. R.; Morgan, J. E.; Blatt, P. M.; Webster, W. P.; Roberts, H. R. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC 27514). *Ann. Intern. Med.* 86(6):703-707; 1977.

The results of percutaneous liver biopsy, under the coverage of glycine-precipitated factor VIII, in six patients with hemophilia A who had persistently abnormal liver function tests for at least 6 months, are described. Each patient was checked for the presence of an inhibitor of factor VIII; if no inhibitor was present, the patient received an infusion of glycine-precipitated factor VIII calculated to raise his factor VIII level to 100%. Blood was drawn after the infusion, and a factor VIII assay was done to be certain that the *in vivo* recovery and half-life of factor VIII were normal. If inhibitor was found, the biopsy was not done. Factor VIII, calculated to raise the factor VIII level to 100%, was administered just before the biopsy. The level was kept at about 75% of normal for 72 hr after the biopsy. Three patients had chronic active hepatitis, and three had chronic persistent hepatitis. No complications were encountered as a result of the biopsy procedure. These results suggest that percutaneous liver biopsy should be considered in patients with hemophilia A with continuously abnormal liver function tests to establish a histologic diagnosis and to guide further therapy.

0636 FOLLOW-UP OBSERVATION OF 52 PATIENTS WITH CHRONIC AGGRESSIVE HEPATITIS. (Ger.)

Wyss, G.; Stalder, G. A.; Bianchi, L. (Medizinische Universitats-Poliklinik, Hebelstrasse 1, CH-4056 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107 (15):520-523; 1977.

The results of the regular clinical, biochemical, and bioptic follow-up of 52 patients (31 men, 21 women, average age 49.5 yr) with histologically proven chronic aggressive hepatitis (CAH) are presented. The length of the follow-up was 0.5-9 yr (average 31 months). The pathological findings included hepatomegaly in 15 cases, spider nevi in 9, palmar erythema in 7, Dupuytren's contracture in 3, and ascites in 3. Pathological serum bilirubin levels were found in 19%, pathological serum glutamic-oxaloacetic transaminase levels in 89%, pathological serum glutamic-pyruvic transaminase levels in 91%, and pathological alkaline phosphatase levels in 13.5%. Fourteen men and 9 women were HBsAg-positive; 4 men and 3 women (among 42 patients) were HBs-antibody-positive; antinuclear antibodies were found in 16 men and 13 women, and anti-smooth muscle antibodies in 17 men and 13 women. The first biopsy revealed CAH in 64% of all cases. Twenty-two patients already had liver cirrhosis at the time of the histological diagnosis of CAH. Six patients were treated with the combination of imurel and prednisone on the basis of adequate indications (histological diagnosis, chronic process, tenfold increase of the transaminase level or fivefold increase of the transaminase level with twofold increase of the gammaglobulin level). Five patients responded to the therapy. Six patients died during the follow-up; the cause of death was hemorrhage of esophageal varices in one case, hepatoma in two cases, bronchial carcinoma in two cases, and carcinoma of the pancreas in one case. The clinical and laboratory findings remained fairly constant during the follow-up period in patients with mild CAH. Exacerbation was seen only in those patients in whom the first biopsy revealed decompensated liver cirrhosis and ascites.

0637 SEROLOGICAL EVIDENCE OF HEPATITIS B INFECTION IN PATIENTS WITH CHRONIC LIVER DISEASES: RADIOIMMUNOASSAY OF HBsAg AND ANTI-HBs. (Eng.)

Skinhoj, P.; Nielsen, J. O.; Dietrichson, O. (Dept. Infectious Diseases, Rigshospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(5):615-619; 1977.

The prevalence of hepatitis B surface antigen (HBsAg) and anti-HBs was determined by a sensitive double-antibody radioimmunoassay technique in 394 patients with chronic liver diseases. The patients were divided into five groups on the basis of information about their alcohol consumption and liver diseases, i.e., patients with 1) cirrhosis of the liver (199), 2) primary biliary cirrhosis (18), 3) steatosis (79), 4) chronic active hepatitis without cirrhosis (74), and 5) chronic persistent hepatitis (24). HBsAg was demonstrated in 37 of 98 consecutive patients with chronic hepatitis and in 14 of 108 patients with nonalcoholic cirrhosis. HBsAg was not found in any of the patients with steatosis, alcoholic cirrhosis, or primary biliary cirrhosis. In the patients with chronic hepatitis, HBsAg or anti-HBs was demonstrated in 83% of the patients below 40 yr of age in contrast to 48% of the patients over 40 yr of age. It is concluded that, in Denmark, the majority of patients with chronic aggressive or persistent hepatitis have serological evidence of previous contact with hepatitis B virus (HBV) infection. This is in contrast to patients with other chronic liver diseases, in whom only a minor proportion of the nonalcoholic cases appear to have been exposed to HBV infection.

0638 DNA BINDING ANTIBODIES IN HBsAg POSITIVE AND NEGATIVE ACUTE AND CHRONIC LIVER DISEASE [Abstract]. (Eng.)

Kingham, J. G. C.; Ganguly, N. K.; Holgate, S. T.; Triger, D. R.; McGuire, M.; Cohen, B.; *et al.* (Southampton

General Hosp., Southampton, England). *Gut* 18(11): A978-A979; 1977.

0639 RELATIVE VALUE OF LYMPHOCYTE CYTOTOXICITY FOR HEPATOCYTES AND CONVENTIONAL BLOOD TESTS IN ASSESSMENT OF HISTOLOGICAL ACTIVITY IN CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Cochrane, A. M. G.; Portmann, B.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Gut* 18(11):A978; 1977.

0640 TREATMENT OF HBsAg-POSITIVE CHRONIC ACTIVE HEPATITIS WITH HUMAN FIBROBLAST INTERFERON [Abstract]. (Eng.) Kingham, J. G. C.; Ganguly, N. K.; Shaari, Z. D.; Holgate, S. T.; McGuire, M. J.; Mendelson, R.; *et al.* (Southampton General Hosp., Southampton, England). *Gut* 18(11):A952; 1977.

0641 CONTROLLED TRIAL OF CYCLOPHOSPHAMIDE IN ACTIVE CHRONIC HEPATITIS [Abstract]. (Eng.) Gilmore, I. T.; Cowan, R. E.; Axon, A. T. R.; Thompson, R. P. H. (St. Thomas' Hosp., London, England). *Gut* 18(11):A952; 1977.

0642 CHRONIC LOBULAR HEPATITIS: A DISTINCT ENTITY [Abstract]? (Eng.) Wilkinson, S. P.; Portmann, B.; Cochrane, A. M. G.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Gut* 18(11):A951-A952; 1977.

0643 NATURAL HISTORY OF CHRONIC PERSISTENT HEPATITIS [Abstract]. (Eng.) Chadwick, R. G.; Galizzi, J.; Heathcote, E. J.; Cohen, B.; Scheuer, P. J.; Sherlock, S. (Royal Free Hosp., London, England). *Gut* 18(11):A951; 1977.

0644 RADIOIMMUNOASSAY FOR ANTIBODIES TO HUMAN LIVER-SPECIFIC MEMBRANE LIPOPROTEIN (LSP) IN CHRONIC ACTIVE HEPATITIS AND CHRONIC PERSISTENT HEPATITIS [Abstract]. (Eng.) Jensen, D.; McFarlane, I. G.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Gut* 18(11):A978; 1977.

0645 NON-FAMILIAL UNCONJUGATED HYPERBILIRUBINEMIA AND REDUCED HEPATIC BILIRUBIN UDP-GLUCURONYL TRANSFERASE ACTIVITY IN PATIENTS WITH CHRONIC PERSISTENT HEPATITIS [Abstract]. (Eng.) Felsher, B. F.; Carpio, N. M. (Long Beach Veterans Admin. Hosp., Long Beach, CA). *Gastroenterology* 73(5):1220; 1977.

See also, 0538, 0563, 0572, 0577, 0598, 0607, 0685.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

0646 PHARMOKINETICS AND PHARMACODYNAMICS OF ETHANOL, WHISKEY, AND ETHANOL WITH n-PROPYL, n-BUTYL, AND ISO-AMYL ALCOHOLS. (Eng.) Auty, R. M.; Branch, R. A. (Fisons Ltd., Pharmaceutical Div., Res. and Development Lab., Bakewell Rd., Loughborough Leics, England). *Clin. Pharmacol. Ther.* 22(2):242-249; 1977.

To determine whether higher aliphatic alcohols exert any effect on the pharmacology of ethanol, plasma ethanol concentration, reaction time, and EEG were recorded in six normal men after ingestion of ethanol alone (group 1), whiskey (group 2), or a mixture of ethanol, n-proponol, n-butanol, and iso-amyl alcohol (group 3). The peak plasma ethanol concentration and the total area under the plasma concentration:time curve of ethanol did not depend upon the type of drink given, but the half-life of the terminal exponential phase of ethanol elimination was longer in group 3. In each study period, reaction time increased, there was a relative increase in delta activity (2-3 Hz), and a fall in mean dominant frequency in EEG activity. The extent of increase in reaction time depended on the rate of increase in plasma concentration and correlated with the concentration of ethanol while the plasma concentration of ethanol was falling. Differences in the effects of ethanol between study periods were minimal.

0647 ULTRASTRUCTURE OF PERIPORTAL AND CENTRILOBULAR HEPATOCYTES IN HUMAN FATTY LIVER OF VARIOUS AETIOLOGY. (Eng.) Petersen, P. (Rigshospitalet, 2100 Copenhagen, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85(3):421-427; 1977.

The ultrastructure of periportal and centrilobular hepatocytes of two alcoholic patients with fatty liver, two diabetic patients, and two obese patients were compared with that of hepatocytes in two patients with normal livers. A striking difference between periportal and centrilobular hepatocytes in all cases of fatty liver was demonstrated. The periportal hepatocytes contained abnormal mitochondria, while centrilobular hepatocytes had normal mitochondria, but fatty vacuoles, peroxisomes, and lysosomes were more abundant. The nature and degree of ultrastructural changes showed no correlation with etiology of the fatty liver. The normal livers showed no such changes or distinct differences between periportal and centrilobular hepatocytes.

0648 THE HEPATIC CONVERSION OF VITAMIN D IN ALCOHOLICS WITH VARYING DEGREES OF LIVER AFFECTION. (Eng.) Lund, B.; Sorensen, O. H.; Hilden, M.; Lund, B. (Frederiksberg Hosp., Copenhagen, Denmark). *Acta Med. Scand.* 202(3):221-224; 1977.

The seasonal variations in circulating 25-hydroxycholecalciferol (25-HCC) were studied in 102 alcoholics with fatty liver disease without histologic signs of cirrhosis, in 35 patients with alcoholic cirrhosis, and 596 normal controls. Alcoholics had generally lower 25-HCC values than did the controls, particularly in the summer. This was explained primarily by insufficient diet and reduced exposure to sunshine. The ability of the liver to hydroxylate in the 25-position was studied in three groups of alcoholics with fatty liver disease without cirrhosis, compensated cirrhosis, or severely incompensated cirrhosis. All three groups exhibited a significant increase in serum 25-HCC following the p.o. administration of cholecalciferol (1,200 U daily for 7 days). Similar rises were seen 7 days after a single injection of 10,000 U cholecalciferol. These findings indicate a normal intestinal absorption of vitamin D, even in advanced alcoholic liver disease, and are inconsistent with a severely damaged 25-hydroxylation capacity in these patients. Osteomalacia due to impaired liver hydroxylation of vitamin D cannot therefore explain the increased fracture rate and the decreased bone mass that have been described in alcoholics.

0649 COMPARISON OF FEATURES OF ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Connell, A. M.; Weir, D.; Fitzgerald, O.; McDonald, W.; Whelton, M.; McCarthy, C.; *et al.* (Univ. Hosp., Cincinnati, OH). *Gut* 18(11):A968; 1977.

0650 CAN WE BELIEVE THE FIGURES? DEATHS FROM CIRRHOSIS AND HOSPITAL PREVALENCE [Abstract]. (Eng.) Hamlyn, A. N.; James, O. (Royal Victoria Infirmary, Newcastle upon Tyne, England). *Gut* 18(11):A968-A969; 1977.

0651 SERUM IMMUNOGLOBULINS IN ALCOHOLIC LIVER DISEASE: CORRELATIONS WITH PORTAL HYPERTENSION, HEPATIC HISTOLOGY AND THERAPY [Abstract]. (Eng.) Maddrey, W. C.; Boitnott, J. K. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Gastroenterology* 73(5):1232; 1977.

0652 LIVER REGENERATION AND HEPATROPHIC HORMONES IN MALNOURISHED ALCOHOLICS [Abstract]. (Eng.) Mahal, A.; Bakth, S.; Brody, D.; Leevy, C. M. (New Jersey Medical Sch., Newark, NJ). *Gastroenterology* 73(5):1233; 1977.

0653 EFFECT OF LOW SODIUM DIET (LSD) ON URINARY KALLIKREIN (UK) AND SODIUM (Na) EXCRETION IN PATIENTS WITH ASCITES FROM ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Wong, P. Y.; Lipinski, T. L.; Capone, R. R. (Albany Medical Coll., Albany, NY 12208). *Gastroenterology* 73(5):1256; 1977.

0654 EFFECT OF ALBUMIN (A), SALINE INFUSION (SI) AND PERITONEOJUGULAR SHUNT (PJS) ON THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM IN PATIENTS WITH REFRACTORY ASCITES (RA) AND ALCOHOLIC LIVER DISEASE (ALD) [Abstract]. (Eng.) Wong, P. Y.; Sarfeh, I. J.; Lipinski, T. L.; Capone, R. R. (Albany Medical Coll., Union Univ., Albany, NY 12208). *Gastroenterology* 73(5):1256; 1977.

0655 EVIDENCE FOR THE PRESENCE OF PROLACTIN SECRETING ADENOMA IN SOME MEN WITH CIRRHOSIS AND GYNECOMASTIA [Abstract]. (Eng.) Van Thiel, D. H.; McClain, C. J.; Elson, M. K.; MacMillan, M. J.; Lester, R. (Dept. Medicine, Univ. Pittsburgh, Pittsburgh, PA). *Gastroenterology* 73(5):1251; 1977.

0656 ABNORMAL GROWTH HORMONE SECRETION IN MEN WITH LAENNEC'S CIRRHOSIS [Abstract]. (Eng.) Van Thiel, D. H.; Smith, W. I., Jr.; Wight, C. J.; Abuid, C. J. (Dept. Medicine, Univ. Pittsburgh, Pittsburgh, PA). *Gastroenterology* 73(5):1251; 1977.

0657 HEPATIC PROLYL HYDROXYLASE ACTIVITY AS A PARAMETER OF COLLAGEN SYNTHESIS AT INITIAL AND SUBSEQUENT BIOPSY OF PATIENTS WITH ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Vidins, E. I.; Fox, S.; Fuller, G. C.; Kuttan, R.; Mann, S. W.; Rodil, J. V. (Dept. Pharmacology, Toxicology, Univ. Rhode Island, Kingston, RI). *Gastroenterology* 73(5):1252; 1977.

0658 HISTOLOGICAL AND ENDOSCOPIC ASPECTS OF ACUTE ALCOHOLIC HEPATITIS. (Spa.) Olivan, J.; Herrerias, J. M.; Perez-Cano, R.; Matilla, A.; Llamas, R.; Garrido, M. (Hospital Universitario de Sevilla, Seville, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(5):527-540; 1977.

See also, 0133, 0134, 0135, 0526, 0535, 0538, 0574, 0598, 0624, 0638, 0668, 0669, 0685.

Cirrhosis

0659 "TO SELECT BETTER--TO SHUNT BETTER." PREREQUISITES FOR A BETTER PORTACAVAL SHUNTING IN LIVER CIRRHOSIS.

(Ger.) Thiel, H.; Wolter, J. (Med. Univ.-Klinik, Josef-Schneider-Strasse 2, 8700 Wurzburg, W. Germany). *Fortschr. Med.* 95(17):1159-1166; 1977.

Criteria that may improve the results of portacaval shunting in liver cirrhosis are discussed. Postoperative liver failure and portasystemic encephalopathy have frequently been reported after portacaval shunting; these may be due to a further reduction in hepatic blood flow, deprivation of the liver of portal venous blood supply with essential substances, and insufficient criteria for the selection of patients for this procedure. Better selection of patients is recommended, involving a complete evaluation of functional liver volume, the reaction of the hepatic artery to a portavenous increased or decreased blood flow, and new techniques to measure preoperative hemodynamics in liver cirrhosis (such as the transumbilical portal vein catheterization by means of a balloon catheter and transluminal portal vein injection with labeled microspheres for the determination of intrahepatic shunt volume). Differentiated shunt techniques (according to individual hemodynamic and functional data) may improve treatment results, especially for selective decompression and liver arterialization.

0660 LEFT SIDED SEGMENTAL PORTAL HYPERTENSION FOLLOWING MESOCAVAL INTERPOSITION SHUNT.

(Eng.) Witte, C. L.; Ovitt, T. W.; Witte, M. H.; Clark, D. S. (Univ. Arizona Coll. Medicine, Tucson, AZ). *Surg. Gynecol. Obstet.* 145(2):169-174; 1977.

Experience with three cirrhotic patients in whom a mesocaval interposition shunt was carried out is presented. Following the procedure, bleeding esophageal varices recurred in two patients, and left sided portal hypertension partially persisted in one patient. Angiographic and pressure studies of the portal system demonstrated effective decompression of the greater splanchnic venous system but continued lesser splanchnic venous hypertension. Recurrent variceal hemorrhage ceased following emergency splenectomy. In contrast to what occurs following a standard portacaval shunt, after an interposition mesocaval shunt, altered jet streaming of mesenteric blood flow may divert gastrosplenic venous drainage away from the interposition shunt with persistence of lesser splanchnic venous hypertension. Recognition of this entity and of the need for splenectomy is advocated.

0661 CHRONIC HEPATIC ENCEPHALOPATHY. A PSYCHOMETRICAL STUDY.

(Eng.) Rehnstrom, S.; Simert, G.; Hansson, J. A.; Johnson, G.; Vang, J. (Dept. Surgery, Univ. Lund, Lund, Sweden). *Scand. J. Gastroenterol.* 12(3):305-311; 1977.

The type and degree of intellectual impairment in hepatic encephalopathy was studied in 41 patients, and the influence of the liver disease etiology and of portasystemic shunts on this impairment was investigated. Psychometric tests were carried out in 41 patients with liver cirrhosis and suspected hepatic encephalopathy and compared with EEG examinations and clinical investigations. Marked intellectual impairment was noted frequently even when the clinical investigation was normal. This difference was mainly due to the preserved verbal ability of the patient. The etiology of the cirrhosis did not influence the test results. Male cirrhotic patients, with and without alcoholism, showed significantly more intellectual impairment than alcoholics without cirrhosis. Patients with portasystemic shunts showed only slightly reduced intellectual ability compared with those without shunts.

0662 RECTAL ^{13}N-AMMONIA TEST (^{13}N-LIVER/HEART RATIO), HEPATIC SINUSOIDAL PRESSURE AND PREVAILING PORTAL FLOW DIRECTION IN CIRRHOSIS OF THE LIVER.

(Eng.) Hazenberg, H. J. A.; Gips, C. H.; Beekhuis, H.; Kruizinga, K. (Dept. Medicine, St. Jozefziekenhuis, Deventer 6600, Netherlands). *Acta Hepatogastroenterol. (Stuttg.)* 23(5):319-327; 1976.

Twelve of 26 patients with liver cirrhosis who had abnormally low 20-min liver/heart ^{13}N activity ratios (<2.25) were compared with cirrhotics who had normal ^{13}N liver/heart activity ratios after rectal administration of ^{13}N-ammonia in terms of several parameters relevant to liver cirrhosis. An abnormal conventional rectal arterial ammonia test (a rise of 17 μM ammonium ion, portasystemic shunts), an abnormally low urea index (1.2, prevailing hepatofugal portal venous flow direction), marked portal hypertension (hepatic sinusoidal pressure of >8 mm mercury), ascites, and extreme enlargement of the spleen occurred significantly ($p=0.04$) more often in patients with abnormally low ^{13}N liver/heart ratios than in those with ratios of 2.25 or greater. There was no correlation between the ^{13}N liver/heart ratio and the absence or presence of esophageal varices. The noninvasive rectal ^{13}N-ammonia test appears to be a convenient and informative test for the diagnosis of liver cirrhosis.

0663 RECTAL ADMINISTRATION OF ^{13}N-AMMONIA IN CIRRHOSIS OF THE LIVER.

(Eng.) Hazenberg, H. J. A.; Gips, C. H.; Beekhuis, H.; Vaalburg, W. (Dept. Medicine, St. Jozefziekenhuis, Deventer 6600, Netherlands). *Acta Hepatogastroenterol. (Stuttg.)* 23(5):308-318; 1976.

^{13}N-activity was measured during 20-min periods in the liver, spleen, heart, lungs, and forearm of 16 controls and 26 cirrhotic patients after the rectal administration of ^{13}N-labeled ammonium acetate solution. In all subjects, ^{13}N activity appeared in the liver 1 min after rectal administration, although, in some patients with cirrhosis, visualization of the liver was faint. At all times during the 20-min measurement period, liver activity was lower in cirrhotics than in controls ($p<0.01$). Liver/heart activity ratios were more discriminating between controls and cirrhotics ($p<0.05$ at all measurement times) than liver/lung and liver/spleen ratios. In controls, the 20-min liver/heart ratio was the most suitable ratio for determining the normal range (2.25-4.15). An abnormally low (<2.25) liver/heart ratio of ^{13}N activity at 20 min after rectal administration was observed in 12 of the 26 patients with cirrhosis. The advantages of the rectal ^{13}N-ammonia test are its noninvasiveness, giving no discomfort to the patient, the rapid disappearance of radioactivity, and the rapidity with which results are obtained.

0664 HEPATIC SUBCELLULAR DISTRIBUTION OF COPPER IN PRIMARY BILIARY CIRRHOSIS: COMPARISON WITH OTHER HYPERHEPATOCUPRIC STATES AND REVIEW OF THE LITERATURE. (Eng.) Owne, C. A., Jr.; Dickson, E. R.; Goldstein, N. P.; Baggenstoss, A. H.; McCall, J. T. (Mayo Clinic, Rochester, MN). *Mayo Clin. Proc.* 52(2):73-80; 1977.

The subcellular distribution of copper was studied in the liver of 17 normal adults, 1 newborn infant, and 35 patients with liver disease, including 4 with primary biliary cirrhosis. The findings were compared with those for the distribution of copper in the liver cell in normal, copper-laden, and copper-deficient adult rats, in newborn rats and pigs, and in adult pigs. A number of these livers were homogenized and divided into five particulate fractions, as well as the supernatant fraction, for copper analyses. Except in one category, it was found that the greater the total liver copper concentration, the greater the proportion in the larger subcellular particles and nuclei. The exception was patients with primary biliary cirrhosis and with very high total hepatic copper, with 45-75% of that copper residing in the supernatant fraction. In the seriously copper-deficient rat, the total hepatic copper was about half the normal amount. In this case, the shortage was reflected almost entirely in the supernatant fraction. By contrast, five patients with liver disease, who had hepatic copper concentrations below the normal range, had most of the copper in the supernatant fraction. It was also found that the copper content of blood exuding from the cut surfaces of the liver was about the same as the copper content of the liver itself.

0665 ESTRONE AND ESTRADIOL IN PATIENTS WITH CIRRHOSIS OF THE LIVER: EFFECTS OF ACTH AND DEXAMETHASONE. (Eng.) Kley, H. K.; Keck, E.; Kruskemper, H. L. (Medizinische Universitatsklinik, Moorenstrasse 5, 4000 Dusseldorf, W. Germany). *J. Clin. Endocrinol. Metab.* 43(3):557-560; 1976.

The influence of the adrenal gland on plasma estrogen levels was investigated in 12 men with hepatic cirrhosis and in 12 healthy male controls. Cirrhotic patients showed normal base cortisol levels (122 ± 41 ng/ml) compared with controls (122 ± 41 ng/ml). Under basal conditions, cirrhotic patients showed moderately higher ($p<0.05$) plasma estradiol levels (36.0 ± 4.7 pg/ml) and considerably higher ($p<0.01$) plasma estrone levels (67.8 ± 20.8 pg/ml) compared with controls (28.5 ± 5.4 and 32.5 ± 5.6 pg/ml for estradiol and estrone, resp.). The administration of ACTH (1 mg, i.v.) significantly ($p<0.01$) increased cortisol and estrone levels to values of 434 ± 68 ng/ml and 139.6 ± 27.5 pg/ml, resp., in cirrhotics and values of 412 ± 63 ng/ml and 59.8 ± 8.5 pg/ml, resp., in controls. Estradiol levels did not significantly change during ACTH stimulation in either group. Adrenal gland suppression with dexamethasone (1.5 mg, p.o., 3 times/day) for 5 days significantly reduced estrone and estradiol levels from basal values of 72.6 ± 26.8 pg/ml and 35.5 ± 2.1 pg/ml, resp., to values of 37.1 ± 17.6 ($p<0.05$) and 23.9 ± 3.6 ($p<0.001$), resp., in cirrhotics and from basal values of 33.3 ± 6.5 pg/ml and 25.5 ± 4.8 pg/ml, resp., to values of 12.0 ± 4.0 ($p<0.001$) and 15.9 ± 4.7 ($p<0.01$), resp., in controls. The absolute decrease of estrone was significantly greater ($p<0.005$) in cirrhotics than in controls, although suppressed plasma levels of estrone, as well as of estradiol, were still higher ($p<0.05$) than those of controls. These findings indicate that the elevated plasma estrone levels in cirrhotic patients are predominantly due to adrenal production and that peripheral conversion of androgens to estrone rather than to estradiol is more effective in sustaining plasma estrogen levels in this disorder.

0666 ENDOTOXAEMIA AND RENAL FAILURE IN CIRRHOSIS AND OBSTRUCTIVE JAUNDICE. (Eng.) Wilkinson, S. P.; Moodie, H.; Stamatakis, J. D.; Kakkar, V. V.; Williams, R. (King's Coll. Hosp. and Medical Sch., London SE5 8RX, England). *Br. Med. J.* 2(6049):1415-1418; 1976.

The possible role of endotoxins in the pathogenesis of renal failure was investigated in 45 patients with cirrhosis and 12 with obstructive jaundice. Twenty-five of the 45 cirrhotic patients had renal failure, and 21/25 had endotoxemia. None of these 21 patients had other evidence of gram-negative infection at the time of the study, and the endotoxemia was therefore probably due to impaired hepatic clearance of toxins normally absorbed from the gastrointestinal tract. In contrast, bacteriological evidence of gram-negative infection was found in four of six patients with obstructive jaundice and endotoxemia. Only 2/20 cirrhotics without renal failure had endotoxemia, and there was a highly significant difference ($p<0.001$) between this group and the renal failure patients. None of the six patients with obstructive jaundice and normal renal function had endotoxemia. The results indicate that there is a close relation between endotoxemia and renal failure in liver diseases.

0667 IMMUNE RESPONSE TO ϕX 174 IN MAN. 5. PRIMARY AND SECONDARY ANTIBODY PRODUCTION IN PRIMARY BILIARY CIRRHOSIS. (Eng.) Thomas, H. C.; Holden, R.; Jones, J. V.; Peacock, D. B. (Royal Free Hosp., Hampstead, London N.W. 3, England). *Gut* 17(11):844-848; 1976.

The primary and secondary immune response to an i.v. antigenic challenge with the bacteriophage ϕX 174 was studied in 12 patients with primary biliary cirrhosis. Patients were injected with 2.0×10^9 plaque-forming units (PFU) of ϕX 174, and blood samples were collected for 28 days. A second injection was given between the 28th and 42nd days, and blood samples were collected for one month. All patients had a normal immunological response to the first injection. After the second injection, four patients had a normal response, and eight demonstrated a marked reduction in IgG and in the concentration of peripheral T cells. The ratio of serum IgM to IgG was significantly ($p<0.25$) increased in the eight patients with impaired immunological response after the second injection. There was no correlation between the degree of alteration of the secondary immune response to ϕX 174 and the severity of the liver cirrhosis, as shown by degree of cholestasis or hepatocellular necrosis.

0668 HEPATIC AND EXTRAHEPATIC COPPER CONCENTRATIONS IN CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Ritland, S.; Johansen, O.; Steinnes, E. (Natl. Hosp. Norway, Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):77; 1977.

0669 SYSTEMIC AVAILABILITY OF LIDOCAINE IN PATIENTS WITH LIVER DISEASE [Abstract]. (Eng.) Tschanz, C.; Steiner, J. A.; Hignite, C. E.; Huffman, D. H.; Azarnoff, D. L. (Univ. Kansas Medical Center, Kansas City, MO). *Clin. Res.* 25(4):609A; 1977.

0670 CERVICAL LYMPHATO VENOUS SHUNT IN TREATMENT OF ASCITES IN CAVAL CONSTRICTED DOGS AND IN PATIENTS WITH HEPATIC CIRRHOSIS. EXPERIMENTAL OBSERVATIONS AND 7 YEARS CLINICAL EXPERIENCE. (Eng.) Serenyi, P.; Magyar, Z.; Szabo, G. (Natl. Inst. Traumatology, Budapest, Hungary). *Lymphology* 9(2):53-61; 1976.

0671 A DOUBLE BLIND CONTROLLED STUDY OF CHOLANGIOGRAPHIC CONTRAST AGENTS IN CIRRHOTIC PATIENTS [Abstract]. (Eng.) Bar-Meir, S.; Ramsby, G. R.; Atterbury, C. E.; Conn, H. O. (Veterans Admin. Hosp., West Haven, CT). *Gastroenterology* 73(5):1212; 1977.

0672 PORTAL HYPERTENSION IN CHILDREN [Abstract]. (Eng.) da Silveira Montenegro, T.; Licht da Silva, G.; Zaslavsky, C.; Pereira Lima, J.; Antunes, C. R.; Almeida, H. (No affiliation given). *Arq. Gastroenterol.* 14(3):161; 1977.

0673 PRESENTING CLINICAL FEATURES OF HBsAg-POSITIVE LIVER CIRRHOSIS IN CHINESE [Abstract]. (Eng.) Lam, K. C.; Lai, C. L.; Lee, A. (Queen Mary Hosp., Hong Kong). *Gastroenterology* 73(5):1230; 1977.

0674 THE ROLE OF ULTRASONOGRAPHY IN THE DIAGNOSIS OF CIRRHOSIS [Abstract]. (Eng.) Lemon, S. K.; Gosink, B. B.; Scheible, F. W. (Veterans Admin. Hosp., San Diego, CA). *Gastroenterology* 73(5):1231; 1977.

0675 ABSORPTION AND HYDROXYLATION OF VITAMIN D IN PRIMARY BILIARY CIRRHOSIS (PBC) [Abstract]. (Ger.) Krawitt, E. L.; Grundman, M. J.; Mawer, E. B. (Dept. Medicine, Univ. Manchester, Manchester, England). *Gastroenterology* 73(5): 1229; 1977.

0676 TRANSITION TO HIGH PROTEIN CIRRHOTIC ASCITES DURING DIURESIS [Abstract]. (Eng.) Hoefs, J. (Univ. Southern California Sch. Medicine, Los Angeles, CA). *Gastroenterology* 73(5):1225; 1977.

0677 EXTRACTS OF ^{125}I ALBUMIN MICROAGGREGATES FROM PORTAL VEIN (PV) AND HEPATIC ARTERY (HA) BLOOD: AN INDEX OF FUNCTIONAL HEPATIC BLOOD SUPPLY IN CIRRHOTICS [Abstract]. (Eng.) Huet, P. M.; DuReau, A.; Marleau, D. (Hopital Saint-Luc, Montreal, Canada). *Gastroenterology* 73(5):1226; 1977.

0678 FUNCTIONAL PORTAL BLOOD SUPPLY: ITS RELATIONSHIP TO 99mTc PHYTATE EXTRAHEPATIC UPTAKE [Abstract]. (Eng.) Huet, P. M.; Marleau, D.; Chartrand, R. (Hopital Saint-Luc, Montreal, Canada). *Gastroenterology* 73(5):1226; 1977.

0679 THE HAEMODYNAMIC AND RENAL EFFECTS OF THE PERITONEOJUGULAR (LEVEEN) SHUNT [Abstract]. (Eng.) Greig, P. D.; Langer, B.; Ruse, J.; Wong, P. Y.; Blendis, L. M. (Dept. Medicine, Univ. Toronto, Toronto, Canada). *Gastroenterology* 73(5):1222; 1977.

0680 CIRCULATING IMMUNE COMPLEXES AND AUTOIMMUNE FEATURES IN PRIMARY BILIARY CIRRHOSIS: IMPLICATIONS FOR PATHOGENESIS [Abstract]. (Eng.) Gupta, R. C.; Dickson, E. R.; McDuffie, F. C. (Mayo Clinic, Rochester, MN). *Gastroenterology* 73(5):1223; 1977.

0681 LIVER SURFACE CHARACTERISTICS AS OBSERVED DURING LAPAROSCOPY CORRELATED TO THE

HISTOLOGICAL FINDINGS OF THE BIOPSY [Abstract]. (Eng.) Heit, H. A.; Johnson, L. F.; Rabin, L. (Walter Reed Army Medical Center, Washington, DC). *Gastroenterology* 73(5):1224; 1977.

0682 THE SERIOUS COMPLICATIONS OF DIURESIS IN THE ASCITIC PATIENT: DOES THE DIURETIC REGIMEN MATTER [Abstract]? (Eng.) Fogel, M. R.; Knauer, C. M.; Sawhney, V.; Miller, R.; Gregory, P. B. (Dept. Medicine, Stanford Univ., Stanford, CA 94305). *Gastroenterology* 73(5): 1220; 1977.

0683 AFFLUENCE, ALCOHOL, AND CIRRHOSIS [Abstract]. (Eng.) Galambos, J. T. (Emory Univ., Atlanta, GA). *Gastroenterology* 73(5):1221; 1977.

0684 PARENTERAL 1,25-DIHYDROXYCHOLECALCIFEROL IN HEPATIC OSTEOMALACIA [Abstract]. (Eng.) Long, R. G.; Varghese, Z.; Meinhard, E.; Skinner, R. K.; Wills, M. R.; Sherlock, S. (Royal Free Hosp., Pond St., Hampstead, London, England). *Gut* 18(11): A954; 1977.

0685 BILIARY AND FAECAL BILE ACID COMPOSITION IN LIVER DISEASE [Abstract]. (Eng.) Krasner, N.; Atherton, S. T.; Nelson, L. M.; Fleming, H.; Russell, R. I. (Royal Infirmary, Glasgow, Scotland). *Gut* 18(11):A988; 1977.

0686 C1q BINDING ACTIVITY AND COMPLEMENT (C1q, C3) CATABOLISM IN PRIMARY BILIARY CIRRHOSIS AND CHRONIC ACTIVE LIVER DISEASE [Abstract]. (Eng.) Thomas, H. C.; Potter, B. J.; Elias, E.; De Villiers, D.; Sherlock, S. (Royal Free Hosp., Hampstead, London, England). *Gut* 18(11):A979; 1977.

0687 NAFCILLIN DISPOSITION IN HEPATOBILIARY DISEASE [Abstract]. (Eng.) Marshall, J. P.; Salt, W. B.; Elam, R. O.; Wilkinson, G. R.; Schenker, S. (Vanderbilt Univ. Sch. Medicine, Nashville, TN). *Clin. Res.* 25(4):608A; 1977.

See also, 0174, 0288, 0535, 0538, 0552, 0553, 0563, 0566, 0574, 0575, 0577, 0580, 0629, 0636, 0638.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

0688 CRITICAL EVALUATION OF PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY. (Ger.) Gattinger, A.; Schmoller, H.; Suwandschieff, N. (Rontgendiagnostisches Zentralinstitut des Landeskrankenanstalten, Mullner Hauptstrasse 48, A-5020 Salzburg, Austria). *Wien. Med. Wochenschr.* 127(7): 218-221; 1977.

The results of percutaneous transhepatic cholangiography (PTC) in 33 patients with suspected bile duct obstruction are presented. Puncture of the ducts was impossible in five cases. The cholangiogram was unremarkable in three cases. Bile duct obstruction due to malignant tumor was diagnosed in 15 cases; all these cases were verified at surgery. The tumors included carcinomas of the gallbladder, head of the pancreas, and of the ampulla of Vater. The cholangiogram showed obstruction due to stones in six cases; the diagnosis was correct in five of six cases, while carcinoma of the head of the pancreas was found in the sixth. Cicatricial stenosis was diagnosed in four cases; this diagnosis was correct in two cases, while recurrent tumor and sandpaper gallbladder were found at surgery in the other two cases. The rate of correct cholangiographic diagnosis was 85.7%. The findings indicate the value of percutaneous transhepatic cholangiography in the diagnosis of obstructive jaundice. This test should not be performed on inoperable patients, nor in those with severe disturbance of blood clotting.

0689 ENDOSCOPIC PAPILLOTOMY (EPT). (Eng.) Manegold, B. C. (Klinikum Mannheim der Universitat Heidelberg, Mannheim, W. Germany). *Chir. Gastroenterol.* 10(4):433-435; 1976.

Experience with endoscopic papillotomy for the treatment of papillary stenosis and small common bile duct stones is presented. This procedure was indicated for common bile duct stones in 58 patients, for papillary stenosis in 3, and for a rare case of obstructive jaundice caused by a foreign body having moved from its bed in the liver into the main bile duct in 1. Endoscopic papillotomy was successful in 55 cases, and complete discharge of concrements was proved in 48. In four cases, papillotomy was successful, but concrements were left behind, making choledochotomy necessary. The procedure was complicated by perforation in two cases, by pancreatitis in three, and by cholangitis in one; these patients were treated conservatively, and all survived. Papillotomy was unsuccessful in seven cases. The papilla was not cannulated in four cases; a juxtapapillary diverticulum was present in one case; and technical difficulties occurred in two cases. Endoscopic papillotomy is an effective, low-risk method for the treatment of papillary stenosis and small common bile duct stones in aged patients. Its success depends upon the length of the incision, the diameter of the stone, and the anatomical form of the prepapillary duct.

0690 ANAEROBIC BACTERIA IN BILIARY DISEASE IN ELDERLY PATIENTS. (Eng.) Shimada, K.; Inamatsu, T.; Yamashiro, M. (Tokyo Metropolitan Geriatric Hosp., 35-2, Sakae-cho, Itabashi-ku, Tokyo 173, Japan). *J. Infect. Dis.* 135(5):850-854; 1977.

Gallbladder bile from 52 elderly subjects (mean age 73.4 yr) who had undergone biliary tract surgery was examined for the presence of bacteria. Thirty-three patients had not been given antibiotics before their operations. Twelve patients had sterile bile, 18 specimens of bile yielded anaerobes as well as aerobes, and 22 yielded aerobic bacteria only. *Escherichia coli* was the most commonly isolated organism (30 strains). *Bacteroides fragilis* was the most frequently encountered anaerobic bacterium and was found in 15 patients. The *Klebsiella-Enterobacter* group was the second most commonly isolated group and *B. fragilis* was third. *Clostridium perfringens* was recovered in 10 bile specimens. Anaerobic bacteria were recovered more frequently in patients with ductal obstruction. The relatively frequent isolation of anaerobes, especially of *B. fragilis*, may be related to the anaerobic techniques used, to the age of the patients, and to the high incidence of pigment stones among the subjects (36/39 patients with cholelithiasis).

0691 BILIARY LIPID SECRETION IN CHOLESTEROL GALLSTONE DISEASE: THE EFFECT OF CHOLECYSTECTOMY AND OBESITY. (Eng.) Shaffer, E. A.; Small, D. M. (Montreal General Hosp., 1650 Cedar Ave., Montreal, Quebec, H3G 1A4, Canada). *J. Clin. Invest.* 59(5):828-840; 1977.

To define the biliary secretory mechanism(s) responsible for the production of abnormal bile leading to cholesterol gallstone disease, the rate of biliary lipid secretion was measured by a duodenal marker perfusion technique, and the bile salt pool was estimated simultaneously by isotope dilution. Two groups of control patients expected to have a normal biliary lipid composition (14 without hepatobiliary disease and 6 with pigment gallstones) were compared with two groups expected to have abnormal bile (10 nonobese patients with cholesterol gallstones and 7 obese subjects without gallstones). Both control groups had nearly identical biliary lipid secretion rates and a corresponding low relative molar concentration of cholesterol. Two different secretory mechanisms were responsible for the abnormal bile in the experimental groups. In the nonobese patients with cholesterol gallstones, bile salt and phospholipid secretion rates were reduced significantly. Conversely, the grossly obese subjects had an increased cholesterol secretion. To determine how cholecystectomy improves biliary lipid composition, three groups of gallstone patients (6 with pigment stones, 4 grossly obese with cholesterol stones, and 13 nonobese with cholesterol stones) were examined after full recovery from surgery. In the nonobese patients with cholesterol gallstones, bile salt and phospholipid secretion increased significantly, causing a definite improvement in bile composition. Cholecystectomy produced a similar but less marked trend in the obese patients with cholesterol stones and in the patients with pigment stones. Cholesterol secretion, however, was unaffected by surgery. The bile salt pool was small in the nonobese patients with cholesterol gallstones, and it became slightly smaller after cholecystectomy. The pool was significantly reduced by cholecystectomy in the pigment stone patients and in the obese patients with cholesterol gallstones. Cholecystectomy in all three groups caused a greater fraction of the pool to cycle around the enterohepatic circulation each hour. This more rapid cycling increased bile salt and phospholipid secretion, and was responsible for the improved composition found after cholecystectomy.

0692 FROM MICROLITH TO GALLSTONE. (Eng.) Van de Wal, J. W. M. (St. Elisabeth Ziekenhuis, Amersfoort, Netherlands). *Tijdschr. Gastroenterol.* 20(2):101-112; 1977.

The relationship between gallstone type and gallbladder histopathology was examined in an unselected series of 120 cholecystectomized patients. Among 14 patients with normal gallbladder histology, cholesterol microliths were found in 8, cholesterol mulberry calculi in 3, and other types of calculi in 3. In 11 patients with hypertrophy and hyperplasia of the gallbladder musculature, cholesterol microliths were found in 2, cholesterol mulberry calculi in 2, and other types of calculi in 7. Cholesterol microliths were found in 1 patient, cholesterol mulberry calculi in 4, and other types of calculi in 6 among 11 patients with minimal signs of gallbladder inflammation. In this latter group, there was an increase in the faceting and deposits of gallstones. Among 84 patients with signs of acute-chronic gallbladder inflammation, cholesterol microliths were found in 5, cholesterol mulberry calculi in 4, and calculi of all sizes, shapes, colors, and compositions in 75. As the condition of the gallbladder progresses from normal to pathological, the proportion of cholesterol microliths decreases in relation to other types of calculi. Muscular hypertrophy and hyperplasia may constitute the first visible alteration of the gallbladder wall during gallstone formation.

0693 OCCURRENCE OF DISSEMINATED INTRAVASCULAR COAGULATION (DIC) IN OBSTRUCTIVE JAUNDICE AND ITS RELATION TO BILIARY TRACT INFECTION. (Eng.) Takeda, S.; Takaki, A.; Ohsato, K. (Kyushu Univ. Faculty Medicine, Fukuoka, Japan). *Jpn. J. Surg.* 7(2):82-89; 1977.

Coagulation studies were done on 78 consecutive cases of obstructive jaundice with or without biliary tract infection to emphasize the significant role of biliary tract infection in the development of disseminated intravascular coagulation (DIC). Among 26 patients with biliary tract infection, 6 patients developed diffuse bleeding tendency (ecchymoses, gastrointestinal bleeding, hematuria, and bleeding from operative wounds, choledochostomies, and venipuncture sites. Supprative cholangitis occurred in all cases. The signs of multiorgan dysfunction were seen in most patients, including oliguria or anuria (3 patients), cardiac symptoms (2), respiratory distress (5), and mental confusion (4). Hypotension was present in five patients. Most patients showed marked coagulation defects characterized by thrombocytopenia, decreased fibrinogen and antithrombin III levels ($p<0.05$), decreased plasminogen levels ($p<0.02$), narrowing of the maximal amplitude in thrombelastograms, increase of fibrin degradation products ($p<0.05$), and increase of positive soluble fibrin monomer complexes. Five patients died from 10 days to 3 months after the biliary tract decompression. In two cases, postmortem examination revealed multiple fibrin thrombi in lungs and other organs. The remaining 20 patients showed no bleeding tendency but remarkable hypercoagulability with decreased fibinolytic activity. The development of DIC was more frequent in cases in which biliary tract decompression failed. These clinical, hematological, and pathological findings strongly suggest that the development of bleeding tendency in obstructive jaundice may be due to the occurrence of DIC, i.e., that hypercoagulability caused by the biliary tract infection is responsible.

0694 FUNCTION CHANGES OF THE SPHINCTER OF ODDI AFTER DIFFERENT TYPES OF VAGOTOMY. (Eng.) Schumann, Z.; Darup, K.; Gentsch, H. (Univ. Erlangen, Dept. Surgery, Nurnberg, W. Germany). *Chir. Gastroenterol.* 10(4):437-439; 1976.

Myoelectric changes in the papilla of Vater were studied in 24 dogs after truncal, selective, or parietal cell vagotomy. In six dogs that underwent truncal vagotomy, there was an initial decrease in tone in the sphincter of Oddi; this tone later increased and approached the initial basal level. The amplitude of the action potential was increased by 150 ± 10 μV per unit, and frequency was decreased to 72 Hz. The extrahepatic bile ducts appeared atonic and dilated. After selective vagotomy, the amplitude was similar to that in nonoperated controls; the frequency was 72 Hz. There were no changes in the electromyographic activity of the papilla of Vater in the dogs that underwent parietal cell vagotomy; the amplitude and frequency were 22 ± 5 μV/U and 100 Hz, resp., values identical with those of the controls. These results indicate that parietal cell vagotomy is the procedure of choice in the treatment of duodenal ulceration.

0695 ENDOSCOPIC PAPILLOTOMY--COMPLICATIONS--RESULTS [Abstract]. (Eng.) Rosseland, A. R.; Valnes, K. (Central Hosp. of Akershus, N-1474 Nordbyhagen, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):85; 1977.

0696 ENDOSCOPIC PAPILLOTOMY IN PATIENTS WITH A BILLROTH-II PARTIAL GASTRECTOMY [Abstract]. (Eng.) Rosseland, A. R. (Centralhosp. of Akershus, N-1474 Nordbyhagen, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):84; 1977.

0697 TREATMENT OF CHOLEDOCHOLITHIASIS BY ENDOSCOPIC PAPILLOTOMY, RE-PAPILLOTOMY AND ENDOSCOPIC CHOLEDOCHODUODENOSTOMY THROUGH CHOLEDOCHODUODENAL FISTULA [Abstract]. (Eng.) Osnes, M. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):66; 1977.

0698 AN ASSESSMENT OF INTRAVENOUS CHOLANGIOGRAPHY (IVC) AND ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY (ERC) IN THE DIAGNOSIS OF CHOLELITHIASIS [Abstract]. (Eng.) Nordshus, T.; Lowe, P. P.; Osnes, M. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):64; 1977.

0699 ERCP AND/OR PTC IN SUSPECTED OBSTRUCTIVE JAUNDICE. REPORT FROM AN ONGOING PROSPECTIVE STUDY [Abstract]. (Eng.) Matzen, P.; Christensen, J. H.; Haubek, A. (Hvidovre Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12 (Suppl. 45):60; 1977.

0700 BACTERIOLOGICAL STUDIES OF CHOLEDOCHAL BILE IN PATIENTS WITH GALLSTONES AND JUXTA-PAPILLARY DUODENAL DIVERTICULA [Abstract]. (Eng.) Lotveit, T.; Osnes, M.; Aune, S. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):58; 1977.

0701 BENIGN POLYPOID TUMORS IN THE COMMON BILE DUCT DEMONSTRATED BY ERCP [Abstract]. (Eng.) Kruse, A.; Mikkelsen, K.; Kraglund, K. (Aarhus Kommunehosp., DK-8000 Aarhus C, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45): 54; 1977.

0702 STONE IN BILE DUCT WITH NEGATIVE CHOLANGIOPANCREATOGRAPHY [Letter to Editor]. (Eng.) Benson, E. A. (Leeds General Infirmary, Leeds LS1 3EX, England). *Lancet* 2(8051):1292; 1977.

0703 VALUE OF TRANSJUGULAR CHOLANGIOGRAPHY FOR THE OPERATIVE EVALUATION OF OBSTRUCTIVE

JAUNDICE [Abstract]. (Eng./Ger.) Thelen, M.; Janson, R.; Schulz, D.; Paquet, K. J. (Radiologische Klinik der Universitat, D-5300 Bonn-Venusberg, W. Germany). *Langenbecks Arch. Chir.* 345:582; 1977.

0704 LATE RESULTS OF MORE THAN 300 BILIODIGESTIVE ANASTOMOSES CAUSED BY TRAUMA OR STRICTURE OF THE BILE DUCT [Abstract]. (Eng./Ger.) Paquet, K. J.; Gutgemann, A. (Chirurgische Universitatsklinik, D-5300 Bonn-Venusberg, W. Germany). *Langenbecks Arch. Chir.* 345:581; 1977.

0705 PROBLEMS OF CONSERVATIVE DISSOLUTION OF GALLSTONES FROM A SURGICAL VIEWPOINT [Abstract]. (Eng./Ger.) Franke, S.; Winter, G.; Klee, W. E. (Chirurgische Universitatsklinik, Josef Schneider-Str. 2, D-8700 Wurzburg, W. Germany). *Langenbecks Arch. Chir.* 345:583; 1977.

0706 OPERATIVE BILIARY ENDOSCOPY [Abstract]. (Eng./Ger.) Lennert, K. A. (Evang. Krankenhaus, Virchowstr. 20, D-4200 Oberhausen/Rhld., W. Germany). *Langenbecks Arch. Chir.* 345:582; 1977.

0707 HIDA SCANNING AS A DIFFERENTIAL DIAGNOSTIC AID IN JAUNDICED PATIENTS [Abstract]. (Eng.) Schoubye, J.; Pedersen, S. A.; Jorgensen, E. O. (Odense Univ. Hosp., Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):90; 1977.

0708 VALUE OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP) [Abstract]. (Eng.) Ruud, T. E. (Telemark Sentralsjukehus, Skien, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):87; 1977.

0709 GREY SCALE ULTRASONOGRAPHY (U.S.) AND ENDOSCOPIC RETROGRADE PANCREATOGRAPHY (ERCP) IN PATIENTS WITH OBSTRUCTIVE JAUNDICE [Abstract]. (Eng.) Hoiseth, A.; Osnes, M.; Swensen, T. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):38; 1977.

0710 THE SIGNIFICANCE OF ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY (ERC) IN PATIENTS ADMITTED FOR BILIARY TRACT SURGERY [Abstract]. (Eng.) Havig, O.; Osnes, M.; Aune, S. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):33; 1977.

0711 BILE DUCT CARCINOMA ASSOCIATED WITH ULCERATIVE COLITIS. (Eng.) Akwari, O. E.; Van Heerden, J. A.; Adson, M. A.; *et al.* (Mayo Clinic Foundation, Rochester, MN). *Rev. Surg.* 33(4):289-293; 1976.

0712 LEIOMYOMA OF THE COMMON BILE DUCT CAUSING OBSTRUCTIVE JAUNDICE. (Eng.) Kune, G. A.; Polgar, V. (Royal Melbourne Hosp., Melbourne, Australia). *Med. J. Aust.* 1(19):698-699; 1976.

0713 JAUNDICE IN SEVERE BACTERIAL INFECTION. (Eng.) Miller, D. J.; Keeton, G. R.; Webber, B. L.; Saunders, S. J. (Univ. Cape Town Liver Res. Group, Univ. Cape Town, Cape Town, South Africa). *Gastroenterology* 71(1):94-97; 1976.

0714 BENIGN BILIARY TRACT DISEASE IN THE PATIENT OVER 80. (Eng.) McKirdie, M. (Good Samaritan Hosp. Medical Center, Portland, OR). *Am. Surg.* 42(7):471-473; 1976.

0715 THE RESULTS OF COMMON DUCT SURGERY. (Fre.) Kayabali, I.; Ceylan, I.; Aras, N. (Faculty Medicine, Anakara, Turkey). *Lyon Chir.* 72(4):251-253; 1976.

0716 ENDOSCOPIC PAPILLOTOMY AS TREATMENT OF CHOLEDOCHOLITHIASIS [Abstract]. (Eng.) Kruse, A. (Aarhus Kommunehospital, DK-8000 Arhus C, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):51; 1977.

See also, 0150, 0256, 0379, 0389, 0438, 0513, 0535, 0575, 0576, 0624, 0671, 0687, 0754.

GENERAL

0717 ALIMENTARY TRACT MANIFESTATIONS OF MULTIPLE ENDOCRINE NEOPLASIA, TYPE 2b. (Eng.) Carney, J. A.; Hayles, A. B. (Mayo Clinic, Rochester, MN). *Mayo Clin. Proc.* 52(9):543-548; 1977.

Alimentary tract manifestations were found in all of 17 patients with multiple endocrine neoplasia, type 2b, and the cases of 7 patients are presented. The alimentary tract manifestations were important because (a) they were chronic; (b) they were severe and led to abdominal operation in 5 patients; (c) they antedated detection of the endocrine neoplasms in the syndrome in 16 patients (94%); and (d) they provided clinical clues that stimulated a search for thyroidal C-cell and adrenal medullary disease in 6 patients. The alimentary tract manifestations were diverse; the symptoms included constipation, diarrhea, difficulty with feeding, projectile vomiting, crampy abdominal pain, and loud borborygmi. Other findings included thickened lips, nodules on the anterior third of the tongue, abdominal distention, visible peristaltic waves, and roentgenographic evidence of megacolon or diverticulosis of the colon or of dilatation of the small intestine and stomach. Initial misinterpretation or failure to realize the significance of one or more of these alimentary tract manifestations led to suspicion of aganglionic megacolon (3 patients), malabsorption syndrome (2 patients), and tracheal ring (1 patient).

0718 IMMUNOGLOBULINS IN JEJUNAL MUCOSA AND SERUM FROM PATIENTS WITH DERMATITIS HERPETIFORMIS.

(Eng.) Baklien, K.; Fausa, O.; Thune, P. O.; Gjone, E. (Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(2):161-168; 1977.

The quantitative distribution of immunoglobulin (Ig)-producing cells was determined by paired immunohistochemistry in the proximal jejunal mucosa of 29 patients with dermatitis herpetiformis (DH). The specimens were categorized stereomicroscopically into three groups on the basis of mucosal abnormality. Compared with control subjects, the total number of Ig-producing cells in a defined "mucosal tissue unit" was raised by a factor of 1.4 in group I (normal or minor abnormality), but the class ratios remained normal. In group III (major abnormality), the total immunocyte number was raised 2.6 times; IgA, IgM, and IgG cells showed a 2.4-, 3.5-, and 5.1-fold increase, resp. Group II (intermediate abnormality) fell between the two other groups with regard to changes in immunocyte population. The local immunocyte pattern was very similar to that previously reported for celiac disease (CD) specimens with comparable mucosal abnormalities. There were few IgD cells, and there was no increase in these cells, compared with control levels. IgE cells were also infrequent, but they were more numerous than in control tissue. As in CD, staining for extracellular Ig in the lamina propria tended to be more intense than that in controls. Normal or increased staining for SC, IgA, and IgM in the crypt epithelium indicated a normal external transfer of these components. DH differed from CD in showing no significant increase in serum IgA level. Serum IgM was reduced in group III, and IgG was increased in group I.

0719 CONGENITAL CHLORIDE DIARRHOEA.

(Eng.) Holmberg, C.; Perheentupa, J.; Launiala, K.; Hallman, N. (Children's Hosp., Univ. Helsinki, Helsinki, Finland). *Arch. Dis. Child.* 52(4):255-267; 1977.

Clinical findings in 21 Finnish children with congenital chloride diarrhea are reported. All children were born 1-8 weeks prematurely. Hydramnios was present in all cases, and no meconium was seen; thus, the onset of diarrhea occurred *in utero*. Diarrhea or passing of large volumes of urine was noted on the first day of life, and the abdomen was usually large and distended. The abnormally large neonatal weight was associated with hypochloremia and hyponatremia. A few infants survived the neonatal period without adequate therapy, but later they developed hypochloremia, hypokalemia, and metabolic alkalosis associated with hyperaldosteronism. However, these conditions may be absent; therefore, diagnosis is based on a history of hydramnios and diarrhea and a fecal Cl^- concentration >90 mM. Lower fecal Cl^- concentrations were seen only in chronic hypochloremia, which is also associated with achloriduria. Adequate treatment consists of full continuous replacement of the fecal losses of water, NaCl, and KCl. These substances should be given i.v. in the early neonatal period; later, they can be given p.o., with meals. The electrolyte dose has to be adjusted to maintain normal serum concentrations, normal blood pH, and some chloriduria. This therapy prevents the renal lesions and the retarded growth and psychomotor development that were seen in children who were diagnosed late and in those who received inadequate replacement therapy. The watery diarrhea persists and increases slightly with age, although patients learn to live with their disease and to make an adequate social adjustment.

0720 SPECIAL O:K:H SEROTYPES AMONG ENTEROTOXIGENIC E. coli STRAINS FROM DIARRHEA IN ADULTS AND CHILDREN: OCCURRENCE OF THE CF (COLONIZATION FACTOR) ANTIGEN AND OF HEMAGGLUTINATING ABILITIES.

(Eng.) Orskov, I.; Orskov, F. (Collaborative Center for Reference and Res. on *Escherichia* [WHO], Statens Seruminstitut, Amager Blvd. 80, DK-2300 Copenhagen S, Denmark). *Medical Microbiol. Immunol. (Berl).* 163(2):99-110; 1977.

Countercurrent immunoelectrophoresis was used to determine polysaccharide K antigens in O:H serotypes among 77 enterotoxigenic *Escherichia coli* strains, including strains from human diarrhea. Members of each O:H serotype had the same type of K antigen and were characterized by a certain fermentation pattern. Some O:H serotypes had no K antigen. The serofermentative types defined were: O6:K15:H16, O8:K40:H9, O15:H11, O25:K7:H42, O25:K98:H^-, O78:H11, O78:H12, and O149:H10. Some strains of serotype O149:H10, which are suspected of being associated with foodborne infections, had K88 antigen. This serotype belongs to the group of strains causing diarrhea in swine. Colonization factor (CF), a pilus-like antigen that is plasmid-controlled and that endows the bacterial cells with an ability to colonize the intestine, was found only in human enterotoxigenic strains belonging to O group 78. In particular, CF was found in 17 of 77 enterotoxigenic strains, and all 17 belonged to O78:H11, O78:H12, or O78:H^-; CF was not found among 248 type O78 strains from sources other than human diarrhea. The presence of CF in type O78 strains was correlated with the presence of a mannose-resistant ability to cause agglutination of human RBC. An examination of the hemagglutinating ability of the other serotypes revealed that O25:K7:H42 strains were similar to the O78 strains in this respect.

0721 EPITHELIOID GERMINAL CENTERS: AN ACQUIRED IMMUNOLOGIC DEFICIT? (Eng.) Millikin, P. D. (Peoria-Tazewell Pathology Group, S.C., 5409 North Knoxville, Peoria, IL 61614). *Am. J. Clin. Pathol.* 67(6):545-549; 1977.

In an attempt to determine whether the fatal outcome of childhood infections associated with epithelioid germinal center abnormalities is related to an acquired immunologic deficit, the histologic structure of lymphoid tissue in cases of fatal infection is reviewed. Epithelioid germinal centers, completely devoid of the usual dark zone of rapidly dividing blast cells, were found in 16 infants and children, one of whom also had Reye's syndrome. In four additional cases, there was toxic follicle alteration, or massive necrosis of germinal center cells. Toxic follicle alteration and epithelioid change have been found in childhood infections and sudden infant death syndrome, and some evidence of a pathogenetic relationship between the two was found in this study. It is concluded that epithelioid change represents a definite pathologic alteration of germinal centers associated with total destruction of a whole population of cells. It probably represents an acutely acquired immunologic deficit and therefore may well contribute to the thus far uniformly fatal outcome of the associated diseases.

0722 ABDOMINAL TUBERCULOSIS: EXPERIENCES WITH 300 CASES. (Eng.) Bhansali, S. K. (81 Valentina Naoroji Gamadia Rd., Bombay 400 026, India). *Am. J. Gastroenterol.* 67(4):324-337; 1977.

Experience with 300 cases of surgically proven abdominal tuberculosis is reviewed. In 161 cases, the onset of illness was insidious; a definite lump was palpable in 96 of these patients. Acute manifestations were seen in 139 patients, with acute abdominal pain being the cardinal feature. Of the 139 patients who presented with acute manifestations, 92 presented with intestinal obstruction; roentgenologic studies detected fluid levels in the flat film of the abdomen in 91 of these 92 patients. Surgery was resorted to when complications were present, when diagnosis was in doubt, and when intrinsic intestinal disease was proved. Surgery was preceded by antituberculous drugs whenever possible. At surgery, the disease was found to involve the alimentary canal in 196 cases, with the small intestine being more frequently involved than the cecum and colon. In 104 cases, only the lymph nodes and/or the peritoneum were affected. Intestinal resection was performed in 101 cases. There were 22 operative fatalities, with 18 resulting after emergency operations. Significant postoperative complications were wound sepsis, bronchopulmonary complications, and fecal fistula. Death due to toxemia within 72 hr after surgery occurred in 15 patients. Positive histology was obtained in 229 cases, and 179 of these showed evidence of caseation. Caseation and peritoneal tubercles (103 cases) differentiated intestinal tuberculosis from Crohn's disease.

0723 A 44-YEAR EXPERIENCE WITH TUBERCULOUS ENTEROCOLITIS. (Eng.) Homan, W. P.; Grafe, W. R.; Dineen, P. (New York Hosp.-Cornell Medical Center, 525 E. 68th St., New York, NY 10021). *World J. Surg.* 1(2):245-250; 1977.

Thirty-one cases of intestinal tuberculosis, diagnosed between 1932 and 1975 at one hospital are reviewed, with particular reference to the impact of antituberculous chemotherapy on the outcome of the disease and to the role of surgery in diagnosis and treatment. The chest x-ray was 90% effective in demonstrating evidence of tuberculosis. However, since even on gross examination differentiation of intestinal tuberculosis from Crohn's disease or neoplasia may be impossible, surgical exploration is indicated when diagnosis is in doubt, and biopsy and culture of intraabdominal tissue should be performed for diagnostic purposes. The importance of instituting immediate therapy is emphasized by a 67% mortality rate in the prestreptomycin era and a 21% mortality rate in patients receiving appropriate drug therapy. Because of the success of chemotherapy, intestinal resection is seldom indicated, except in those cases in which scarring and stricture formation demand surgical relief of intestinal obstruction or in which the complications of fistula, hemorrhage, or perforation may occur.

0724 GASTRIC MUCOSA IN PATIENTS WITH RHEUMATOID ARTHRITIS TREATED WITH ANTI-INFLAMMATORY AGENTS. CLINICAL, RADIOLOGICAL, ENDOSCOPIC, PATHOLOGICAL AND ULTRASTRUCTURAL STUDY. (Fre.) Gaucher, A.; Serot, J. M.; Gaucher, P.; Rauber, G.; Grignon, G.; Pourel, J.; *et al.* (Hopital de Brabois, F 54500 Vandoeuvre-les-Nancy, France). *Nouv. Presse Med.* 5(41):2781-2784; 1976.

0725 THE DIGESTIVE ORIGIN OF Campylobacter SEPTICEMIAS. (Fre.) Butzler, J. P.; Derume, J. P.; Barbier, P.; Smekens, L.; Dekeyser, J. (Hopital Universitaire St-Pierre, 322, rue Haute, B-1000 Brussels, Belgium). *Nouv. Presse Med.* 6(12):1033-1035; 1977.

0726 RESULTS OF A ONE-YEAR EPIDEMIOLOGICAL SURVEY ON DIGESTIVE TRACT CANCER IN GOLD COAST [Abstract]. (Fre.) Faivre, J.; Faivre, M.; Legoux, J. L.; Cueugnet, C.; Martin, F.; Michiels, R.; *et al.* (Hopital General, 21033 Dijon Cedex, France). *Gastroenterol. Clin. Biol.* 1(5):483-484; 1977.

0727 COMPARATIVE CHARACTERISTICS OF CORTICOSTEROIDS IN PATIENTS WITH DIFFERENT GASTROINTESTINAL TRACT CANCERS. (Rus.) Yelchits, T. V.; Mayevskaya, L. P.; Tarutinov, V. I. (Kiev Scientific Res. Inst. Roentgenology, Radiology and Oncology, Kiev, USSR). *Vrach. Delo* (3):40-42; 1977.

0728 COLON CARCINOMA--DURATION OF ANAMNESIS AND SURVIVAL TIME. (Ger.) de Heer, K.;

Eichfuss, H. P.; Vorwig, K. H. (Chirurgische Universitatsklinik und Poliklinik, Hamburg-Eppendorf, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Zentralbl. Chir.* 102(3):143-149; 1977.

0729 EOSINOPHILIC GRANULOMA OF THE GASTROINTESTINAL TRACT. (Ger.) Rendl, K. H. (Gefasschirurgische Abteilung, Landeskrankenanstalten, A-5020 Salzburg, Austria). *Wien. Med. Wochenschr.* 126(25/27):370-373; 1976.

0730 CLINICAL AND THERAPEUTIC STUDY OF CHOLERA AT DAHOMEY (OBSERVATION OF 133 CASES). (Fre.) Dournon, E. (No affiliation given). *Bull. Soc. Pathol. Exot.* 69(1):11-21; 1976.

0731 CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF ACUTE INTESTINAL DISEASES INDUCED BY NONAGGLUTINATING VIBRIOS. (Rus.) Iakubov, O. Ia.; Dzhalalov, Kh. D.; Inzhevatova, M. V.; Mukhamedov, S. M.; Ziiaev, Sh. I.; Khusainova, S. A. (Uzbek Antiplague Station, Uzbek, USSR). *Med. Zh. Uzbek.* (11):58-59; 1976.

0732 CHARACTERISTICS OF THE CLINICAL COURSE AND DIAGNOSIS OF INTESTINAL E. coli INFECTION IN CHILDREN. CURRENT STATUS. (Rus.) Timofeeva, G. A.; Speranskii, N. P.; Gusarskaia, I. L. (Leningrad Scientific Res. Inst. Childhood Infections, Leningrad, USSR). *Pediatriia* (7):34-37; 1976.

0733 EFFECT OF BRAN ON BILE SALT METABOLISM IN CONSTIPATED PERSONS [Abstract]. (Fre.) Audigier, J. C.; Herr, P.; Minaire, Y.; Mallein, R.; Lambert, R. (INSERM U-45, Hopital Edouard-Herriot, 69374 Lyon Cedex 2, France). *Gastroenterol. Clin. Biol.* 1(4):396-397; 1977.

0734 DUPLICATION OF THE GASTROINTESTINAL TRACT. LITERATURE REVIEW AND CASE REPORT. (Ger.) Krenn, R. (Landeskrankenhaus Klagenfurt, Kinderchirurgische Abteilung, St. Veiter Strasse 47, A-9010 Klagenfurt, Austria). *Wien. Med. Wochenschr.* 126(20/22):302-304; 1976.

0735 COMPARATIVE EFFICIENCY OF DIFFERENT METHODS OF TREATMENT OF PATIENTS WITH ACUTE DYSENTERY. (Rus.) Gebesh, V. V.; Yanushevskaya, R. I.; Babak, V. I.; Kiriyenko, M. S.; Lysak, L. I. (Kiev Scientific Res. Inst. Infectious Diseases, Ukrainian SSR Ministry of Public Health, Kiev, USSR). *Vrach. Delo* (5):137-141; 1977.

0736 CONCENTRATION OF CORTISOL, GASTRIN, INSULIN AND GROWTH HORMONE IN THE BLOOD SERUM OF PATIENTS WITH CHRONIC ENTEROCOLITIS. (Rus.) Ivanov, S. G. (USSR Ministry of Public Health, Moscow, USSR). *Ter. Arkh.* 49(5):79-82; 1977.

0737 DIGESTIVE TRACT HEMORRHAGES DUE TO ACUTE DRUG-INDUCED ULCER: PROGNOSIS AND TREATMENT [Abstract]. (Fre.) Franco, D.; Murat, I.; Deporte, A.; Bismuth, H. (Hopital Paul-Brousse, avenue Paul-Vaillant Couturier, 94800 Villejuif, 14, France). *Gastroenterol. Clin. Biol.* 1(5):482; 1977.

0738 CLINICAL ASPECTS OF THE NONTUMOROUS DISEASES OF THE SALIVARY GLANDS. (Ger.) Haubrich, J. (Univ.-Hals-Nasen-Ohrenklinik, Geiststr. 5/10 D-3400 Gottingen, W. Germany). *Arch. Otorhinolaryngol. (NY)* 213(1):1-59; 1976.

0739 GASTROINTESTINAL HEMORRHAGES AS COMPLICATIONS OF MYOCARDIAL INFARCTION. (Rus.) Belousova, I. M. (6th Clinical Hosp., USSR Ministry of Public Health, Moscow, USSR). *Vrach. Delo* (5): 16-21; 1977.

0740 IMMUNOCYTES AND IMMUNOGLOBULINS IN THE DIGESTIVE TRACT DURING PRIMARY IMMUNE DEFICIENCY IN ADULTS [Abstract]. (Fre.) Matuchansky, C.; Galian, A.; Goldfain, D.; Rambaud, J. C.; Modigliani, R.; Bernier, J. J. (Hopital Saint-Lazare, 107, rue du Faubourg-Saint-Denis, 75010 Paris, France). *Gastroenterol. Clin. Biol.* 1(5): 485; 1977.

0741 PRESSURE TEST FOR DETECTION OF MICROPERFORATIONS. CONTRIBUTION TO CHOLEPERITONEUM WITHOUT PERFORATION. (Ger.) Walzel, C. (Chirurg. Abteilung, Krankenhaus der Barmherzigen Bruder, Grosse Mohrengasse 9, A-1020 Vienna, Austria). *Chirurg* 47(6):345-347; 1976.

0742 PROBLEMS OF Saccharomycopsis IN THE GASTROINTESTINAL TRACT. (Ger.) Knoke, M.; Bernhardt, H.; Schwesinger, G. (Med. Klinik und Poliklinik, Ernst-Moritz-Arndt-Universitat, Friedrich-Loeffler-Str. DDR-22 Greifswald 23, E. Germany) *Dtsch. Z. Verdau. Stoffwechselkr.* 36(2):69-71; 1976.

0743 SALIVARY GLAND TUMORS OF UNUSUAL LOCALIZATION. (Ger.) Kecht, B. (Untere Donaulande 26, A-4020 Linz, Austria). *Wien Med. Wochenschr.* 126(25/27):363-365; 1976.

0744 ABDOMINAL TRAUMA: INJURIES OF THE DIGESTIVE TRACT AND RETROPERITONEAL ORGANS. (Ger.) Allgower, M. (Chirurgisches Departement, Kantonsspital, CH-4031 Basel, Switzerland). *Helv. Chir. Acta* 44(1/2):63-72; 1977.

0745 CHARACTERISTICS OF THE CLINICAL COURSE OF MODERN TYPHOID FEVER. (Rus.) Shugailo, V. T.; Kimelblat, M. A.; Yaremchuk, Y. A.

(Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Vrach. Delo* (3):140-142; 1977.

0746 VALUE OF THE SECRETIN TEST IN THE DIAGNOSIS OF ZOLLINGER-ELLISON SYNDROME, PROGRESSIVE DUODENAL ULCER WITH BASAL GASTRIC ACID HYPERSECRETION AND IN RECURRENT ULCER FOLLOWING SURGERY FOR DUODENAL ULCER [Abstract]. (Fre.) Mignon, M.; Accary, J. P.; Bonfils, S. (Hopital Bichat, 75018 Paris, France). *Gastroenterol. Clin. Biol.* 1(5):491; 1977.

See also, 0093, 0218, 0238, 0246, 0286, 0288, 0294, 0296, 0302, 0316, 0337, 0388, 0419, 0421, 0452, 0457, 0503, 0510, 0521, 0532, 0652, 0713, 0768.

GENERAL

Parasitology

0747 VISUALIZATION OF THE AMEBIC ABSCESS OF THE LIVER WITH PERFUSION OF DIATRIZOATES. (Fre.) Limbos, P.; de Bergeyck, E. (Institut de Medicine tropicale d'Anvers, Antwerp, Belgium). *Acta Gastroenterol. Belg.* 40(3/4):159-166; 1977.

0748 AMEBIASIS. PART 2. (Ger.) Werner, G. T.; Stickl, H. (Bayerische Landesimpanstalt Munchen, Munchen, W. Germany). *Med. Klin.* 71(51/52):2254-2259; 1976.

0749 HYDATID CYSTS OF THE LIVER AND ECHOGRAPHY. (Fre.) Pietri, H.; Roussille, M.; Duquesnel, C. (No affiliation given). *J. Radiol. Electrol. Med. Nucl.* 57(8/9):606-607; 1976.

0750 HYDATID DISEASE DUE TO Echinococcus multilocularis: ANALYSIS OF 43 CASES TREATED AT NANCY [Abstract]. (Fre.) Gabriel, A.; Gaucher, P.; Bigard, M. A.; Penin, F.; Rothhahn, B.; Fays, J.; *et al.* (No affiliation given). *Gastroenterol. Clin. Biol.* 1(4):398-399; 1977.

0751 HYDATID CYSTS OF THE LIVER IN CHILDREN. REPORT OF 40 CASES. (Fre.) Saied, H.; Paley, D.; Dupre, A.; Chantereau, M.; Lacki, W. (Hopital des Enfants, Tunis, Tunisia). *Ann. Chir. Infant.* 18(1):58-61; 1977.

0752 SURGICAL TREATMENT OF HYDATID CYST OF THE LIVER. (Fre.) Maillet, P. (No affiliation given). *J. Med. Lyon* 57(1303):347-352; 1976.

0753 INFESTATION WITH Lamblia intestinalis. (Pol.) Ananko, J.; Jankowska-Bartel, M.; Porada, D. (Wojewodzki Szpital Zespolony, ul. Tochtermana 1., 26-600 Radom, Poland). *Wiad. Lek.* 30(6):429-432; 1977.

0754 TREMATODES IN THE BILE DUCTS. (Ger.) Dippon, R.; Widmer, A. (Chir. Klinik, Kantonsspital, CH-5000 Aarau, Switzerland). *Helv. Chir. Acta* 43(5/6):553-555; 1976.

0755 GIARDIASIS IN INFANCY AND MALABSORPTION SYNDROME [Abstract]. (Eng.) Fagundes Neto, U.; Wehba, J.; Patricio, F. R. S.; Machado, N.; Silvestrini, W. S. (No affiliation given). *Arq. Gastroenterol.* 14(3):159-160; 1977.

0756 FLUORESCENT ANTIBODY STUDIES IN GIARDIASIS [Abstract]. (Eng.) Wright, S. G.; Moody, A. H.; Tomkins, A. M.; Ridley, D. S. (Hosp. Tropical Diseases, London, England). *Gut* 18(11):A986; 1977.

See also, 0233, 0285, 0419, 0444, 0468, 0490, 0492, 0498.

GENERAL

Regional Enteritis

0757 INTRAMURAL GANGLION CELL DEGENERATION IN INFLAMMATORY BOWEL DISEASE. (Eng.) Oehmichen, M.; Reifferscheid, P. (Institut fur Hirnforschung, Universitat Tubingen, Belthlestrasse 15, D-7400 Tubingen, W. Germany). *Digestion* 15(6):482-496; 1977.

Comparable histologic alterations of intramural nervous tissue were reported in various diseases of the small and large intestine. In six patients, an intestinal obstruction led to secondary intramural inflammation. The obstruction was induced by the spastic segment in Hirschsprung's disease (3 cases), by rectal atresia (2), and by postoperative ischemic damage to the intestinal wall (1). In four other patients, the inflammation was predominant, and it was due to necrotizing enterocolitis (1 case), membranous enteritis (1), and Crohn's disease (2). In all cases, various degrees of inflammatory lymphocytic infiltration were observed proximal to the obstruction. Other common alterations were splitting of nerve fibers and deteriorations of nerve cells (degenerative alterations) in the plexus myentericus, as well as hyperplasia and hyperchromasia of the ganglion cells, Schwann cell proliferation, and fibrosis in the nerve fibers (reactive alterations). Until now, these alterations were only observed in Chagas' disease and in ulcerative colitis, especially when these conditions were complicated by toxic megacolon. The neurodegenerative alterations in these diseases may be toxically induced.

0758 REGIONAL ILEITIS (CROHN'S DISEASE). I. KINETICS OF BILE ACID ABSORPTION IN THE PERFUSED ILEUM. (Eng.) Krag, E.; Krag, B. (Herlev Hosp., DK-2730 Copenhagen/Herlev, Denmark). *Scand. J. Gastroenterol.* 11(5):481-486; 1976.

Glycochenodeoxycholic acid (GCDC) absorption was studied by the steady state perfusion technique in the ileum of 11 patients with regional ileitis (Crohn's disease). Computerized absorption kinetics demonstrated a saturable transport system and a competitive absorption between conjugated bile acids, suggesting that GCDC is actively transported. At the time of the investigation, five patients had no diarrhea, whereas six had diarrhea, as defined by the amount of fecal output (>200 g/day). In the former group, the fecal bile acid excretion was low, and the ileal absorption of GCDC was high; the ileal absorption surface was judged to be large compared with that in the patients with diarrhea, on the basis of xylose absorption. In the patients with diarrhea, the fecal bile acid excretion was high, the ileal absorption of GCDC was low, and the ileal absorptive surface was small. It is concluded that malabsorption of bile acids in the ileum may be of significant physiological importance in the pathogenesis of diarrhea in patients with regional ileitis.

0759 DIAGNOSTIC AND THERAPEUTIC PROBLEMS OF ANAL COMPLICATIONS IN CROHN'S DISEASE [Abstract]. (Ger.) Krieg; Gamstatter; Gronniger. (No affiliation given). *Zentralbl. Chir.* 102(2):117; 1977.

0760 SERUM LYSOZYME CONCENTRATIONS IN PATIENTS WITH CROHN'S DISEASE BEFORE AND AFTER BOWEL RESECTION. (Ger.) Pott, G.; Schmidt, A.; Buddecke, E.; Gerlach, U. (Medizinische Univ.-Klinik, Westring 3, D-4400 Munster, W. Germany). *Klin. Wochenschr.* 55(11):557-558; 1977.

0761 MACHROCHEILIA AND CROHN'S DISEASE. (Ger.) Tondury, G. D. (Spezialarzt FMH fur Innere Medizin, speziell Gastroenterologie, Bahnhofstrasse 16, 6300 Zurich, Switzerland). *Praxis* 66(26):792-793; 1977.

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ABSTRACTS
AND
CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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DEPOSITORY

The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED$_{50}$	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
µg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K$_m$	Michaelis constant
LD$_{50}$	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
µM	micromolar; micromole(s)
ma	milliampere(s)
mCi, µCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)

ml, µl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

0778 CYTOCHEMICAL STUDY OF INTESTINAL ENDOCRINE CELLS IN RABBIT FETUSES DURING IN VITRO INDUCED DEGENERATION AND DIFFERENTIATION. (Fre.)

Lefranc, G.; Pradal, G.; L'Hermite, A. L.; Andre, M. J.; Ducluzeau, A. (Laboratoire d'histologie et Embryologie, Faculte de Medecine, F-44 Nantes, France). *Histochemistry* 53(2):157-163; 1977.

In vitro culture of fragments of the intestinal mucosa of rabbit fetuses in solid media induces epithelial degeneration followed by regeneration. At the end of 3 days, degenerated necrotic cells sloughed off in the intestinal lumen and regenerating cells in contact with the chorion could be observed on the same histological section. The histochemical characteristics of the serotonin cells were studied and related to the stages of differentiation. The cells acquired successively the following characteristics: fluorescence induced by formaldehyde (FIF), then argyrophilia, then affinity for silver salts. *In vivo* studies have shown that FIF and argyrophilia appear simultaneously. These *in vitro* studies suggest an extra step in the differentiation of the serotonin-producing cells of the intestine that may exist *in vivo* but has not as yet been observed.

0779 ENDOCRINE CELLS IN THE HUMAN FETAL SMALL INTESTINE. (Eng.)

Moxey, P. C.; Trier, J. S. (Peter Bent Brigham Hosp., 721 Huntington Ave., Boston, MA 02115). *Cell Tissue Res.* 183(1): 33-50; 1977.

The time of appearance and ultrastructural features of enteroendocrine cells (EECs) were studied in the human fetal small intestine between 9 and 22 weeks of gestation. Thirteen distinctive EECs were identified in fetal small intestine. Two of these, not found in normal small gut, appeared within the stratified epithelium of the proximal small intestine at 9-10 weeks. They were arbitrarily termed "primitive" and "precursor" cells. As in all fetal EECs, the pale cytoplasm of the "primitive" cell contained a distinctive population of secretory granules (SGs). Primitive cell SGs averaged 200-330 nm; some had dense cores with lucent halos, while others were filled with a homogeneous dense or flocculent material. The SGs of the "precursor" cells were larger, averaging up to 1 µm in diameter, and their contents varied in electron density. A third group of cells not described in adult small bowel was arbitrarily termed "transitional" cells. These had two populations of SGs; one resembled the SGs of the "precursor" cells, and the other resembled the SGs of some of the specific adult type EECs. Transitional enterochromaffin (EC), S, I, and G cells were seen. In addition, mature appearing EC, S, G, I, L, D, and D_1 cells were identified by 12 weeks of gestation. The "primitive," "precursor," and "transitional" cells may represent sequential developmental precursors of adult type EECs.

0780 RABBIT ILEAL MUCOSA EXPOSED TO FATTY ACIDS, BILE ACIDS, AND OTHER SECRETAGOGUES: SCANNING ELECTRON MICROSCOPIC APPEARANCES. (Eng.)

Gaginella, T. S.; Lewis, J. C.; Phillips, S. F. (Coll. Pharmacy, Ohio State Univ., Columbus, OH 43210). *Am. J. Dig. Dis.* 22(9):781-790; 1977.

Segments of rabbit ileum were examined by scanning electron microscopy (SEM) after exposure to various compounds known to stimulate small intestinal fluid secretion. After perfusion with 10 mM ricinoleate, striking changes were observed at villus tips and on the apicolateral surfaces of villi; erosions at tips were confirmed by light microscopy of the same pieces of tissue examined by SEM. The apicolateral surfaces of the villi had a "cracked clay" appearance. The appearances after ricinoleate were reversed in part during perfusion with control buffer for 2 hr. Statistical comparisons between control perfused, treated, and reversal tissues showed that the "damage" produced by ricinoleate, and its reversal, was statistically significant. Tissues treated with other intestinal secretagogues, oleic acid (10 mM), deoxycholic acid (4 mM), cholic acid (4 mM), dioctyl sodium sulfosuccinate (6 mM), and cholera toxin (1 µg/ml) also showed surface changes by SEM. Sodium oleate and sodium deoxycholate produced villus tip changes, dioctyl sodium sulfosuccinate and sodium cholate resulted in the "cracked clay" pattern, and cholera toxin produced both changes. Fluid secretion, produced by mannitol was not associated with "damage." Structural changes of the mucosal surface after exposure to intestinal secretagogues should be considered as one possible mechanism of impaired fluid transport.

0781 COLONIC MUCOSAL ATROPHY INDUCED BY A LIQUID ELEMENTAL DIET IN RATS. (Eng.)

Janne, P.; Carpentier, Y.; Willems, G. (Hopital Saint-Pierre, rue Haute 322, B. 1000 Brussels, Belgium). *Am. J. Dig. Dis.* 22(9):808-812; 1977.

The effect of feeding a liquid elemental diet (Vivonex®) for 4 weeks on the weight, the total crypt cell population, and the proliferation parameters of the colon was studied in male Wistar rats. Both mitotic activity and DNA synthesis activity were decreased ($p<0.01$) in the colonic mucosa during the administration of the diet, in comparison with that in controls. The weight of the colon was decreased ($p<0.01$) from the first week of treatment. After 4 weeks, a 75% decrease in the cell population of mucosal glands was observed, indicating that there had been considerable atrophy of the colonic mucosa. This atrophy was probably mediated by a reduction in the proliferative activity of the stem cells in the mucosal glands.

0782 MORPHOLOGY OF THE ISOLATED OXYNTIC CELL AND SOME PHYSIOLOGICAL PARAMETERS. (Eng.)

Ito, S.; Munro, D. R.; Schofield, G. C. (Harvard Medical Sch., Boston, MA 02115). *Gastroenterology* 73(4):887-898; 1977.

The morphology of the isolated mouse oxyntic cell is described and compared with that of the intact stomach. Isolated oxyntic cells adopt a variety of morphological configurations. Some cells retain their polarity, so that a portion of the surface membrane is formed by laterobasal membrane and the remainder by luminal surface membrane with secretory or intracellular canaliculi opening to the outer surface. Other cells present a smooth outer surface and a completely internalized canaliculus. There are also oxyntic cells in which the whole surface membrane is covered with numerous microvilli resembling those of the luminal surface of oxyntic cells *in situ*. In cells where both laterobasal and luminal membrane can be distinguished, a junctional region that shows an intermixing of these two types of surface membranes is seen. Intracellular canaliculi of isolated oxyntic cells may be either distended and lined by microvilli or virtually collapsed and occluded by numerous microvilli. Evidence of functional activity by isolated oxyntic cells includes a small but consistent movement of chloride toward the cathode when a polarizing potential is applied to isolated cells forming a monolayer. Uptake studies with ^{3}H-leucine indicate that isolated oxyntic cells avidly incorporate this substrate and apparently metabolize it. Current studies on respiration by isolated oxyntic cells reveal a doubling of oxygen consumption when succinate is added to the incubating medium. However, oxygen utilization by isolated cells from acetazolamide-inhibited mice is only one-half that of nontreated control cells.

0783 FROG GASTRIC TUBULAR CELLS: ISOLATION, CULTURE, AND SOME PROPERTIES. (Eng.)

Kasbekar, D. K.; Blumenthal, G. H. (Georgetown Univ. Sch. Medicine and Dentistry, Washington, DC 20007). *Gastroenterology* 73(4):881-886; 1977.

The methods used for obtaining primary cultures of the gastric tubular cells from *Rana catesbeiana*, the maintenance of their differentiated state under culture conditions of several weeks, and some of their properties are described. The problem of microbial contamination in the amphibian cells was overcome by incubating the cells in medium containing an antibiotic mixture. During the first few days after isolation and culture, cell surface damage was manifested by enhanced leakage of intracellular pepsinogen and a lack of response to known gastric secretagogues with respect to pepsinogen release and respiration. After several days in culture, the cellular pepsinogen levels increased slightly but significantly, and the spontaneous loss of pepsinogen from the cells showed a marked decline, indicating repair of the initial membrane or surface damage. The intact cells possessed *p*-nitrophenylphosphatase activity. After several days in culture, the respiratory activity became sensitive to the serum concentrations of the culture medium and was relatively stable. Antibiotics used in establishing primary cultures reversibly inhibited respiration and pepsinogen synthesis. A variable response to the gastric secretagogues was observed with regard to respiratory and pepsinogen secretory activities, whereas the *p*-nitrophenylphosphatase activity remained unaffected. There was no indication that the cells divided under the present culture conditions. Although these cells did not attach firmly to the surface of plastic or glass culture flasks, preliminary evidence indicates that collagen gel may provide an appropriate matrix for cell attachment. Further studies with a reconstituted epithelium comprised of a homogeneous gastric tubular cell population are indicated.

0784 TERMINATION AND LUMEN OF THE HEPATO-PANCREATIC EXCRETORY DUCTS. A MORPHOMETRI STUDY. (Ger.)

Muller, M.; Putzke, H. P. (Institut fur Allgemeine und Spezielle Pathologie, Wilhelm-Pieck-Universitat, Strempelstrasse 14, DDR-25 Rostock, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(1):1-6; 1977.

The termination and lumen of the hepatopancreatic excretory system was studied in 200 autopsy cases. Common papilla was found in 183 cases and common pancreaticobiliary duct in 141. The hepatopancreati excretory system had type y termination in 70.5% of all cases, type v in 21%, and type u in 8.5%. The average length of the ampulla of Vater was 5.4 mm. The diameter of the pancreatic duct was 7.3 mm in the head of the pancreas, 5.7 mm in the body, and 2.5 mm in the tail. The diameter of the choledochal duct was 3.5 mm at its entry into the ampulla of Vater and into the duodenum, 12 mm at 2-cm distance proximally, and 16.5 mm at 6-cm distance proximally. No correlation was found between the lumen of the pancreatic duct and the type of the termination, but the size of the lumen increased with age.

0785 ULTRASTRUCTURAL STUDY OF COLONIC MUCOSA INVASION BY E. histolytica. (Spa.)

Trevino, N.; Cruz de Lavin, E.; Tanimoto-Weki, M. (Centro Medical Nacional, Instituto Mexican del Seguro Social, Av. Cuahtemoc 330, Mexico 7, D.F.). *Arch. Invest. Med. (Mex.)* 8(1):71-83; 1977.

0786 ANATOMY OF THE ANORECTAL SPHINCTER AND ITS SURGICAL IMPLICATIONS. (Por.)

Matos, D.; Werneck Lima, J.; De Oliveira, E. (Hospital Sao Paulo, Sao Paulo, Brazil). *Bol. Sanat. Sao Lucas* 38(4):147-160; 1977.

0787 THE EFFECT OF ETHANOL ON THE ULTRASTRUCTUR OF ACINI OF THE PANCREAS. (Rus.)

Podolsk A. E. (N. V. Sklifovsky Res. Inst. Emergency Aid, Moscow, USSR). *Biull. Eksp. Biol. Med.* 83(3):377-379; 1977.

0788 STRUCTURE AND INNERVATION OF THE CHOLEDOCHO DUODENAL JUNCTION. (Eng.) Kyosola, K. (Dept. Anatomy, Univ. Helsinki, Helsinki, Finland). *Ann. Chir. Gynaecol.* 65(Suppl. 192):1-135; 1976.

0789 ENDOCRINE CELLS IN THE NORMAL HUMAN COLON AND RECTUM: ULTRASTRUCTURAL STUDY [Abstract]. (Eng.) Cristina, M. L.; Lehy, T.; Zeitoun, P. (INSERM U-10, Hopital Bichat, 75877 Paris, Cedex 18, France). *Digestion* 16(1/2): 207-208; 1977.

See also, 0795, 0840, 0864, 0878, 0890, 0928, 0967, 1001, 1007, 1008, 1039, 1041, 1053, 1069, 1070, 1113, 1169, 1208, 1210, 1214, 1216, 1266, 1329, 1347, 1561, 1676.

ABSORPTION - EXCRETION - TRANSPORT

0790 POSTPRANDIAL SERUM BILE ACIDS IN HEALTHY MAN: EVIDENCE FOR DIFFERENCES IN ABSORPTIVE PATTERN BETWEEN INDIVIDUAL BILE ACIDS. (Eng.) Angelin, B.; Bjorkhem, I. (Dept. Medicine, Serafimerlasarettet, S-112 83 Stockholm, Sweden). *Gut* 18(8):606-609; 1977.

The hypothesis was tested that substantial dihydroxy bile acid absorption in the proximal small intestine is responsible for observed increases in the cholic acid (C)/chenodeoxycholic acid (CD) and C/deoxycholic acid (D) ratios in intestinal aspirates along the proximal intestine. The serum concentrations of C, CD, and D before and after a standardized meal were determined in five healthy women using a highly specific and accurate gas chromatographic-mass spectrometric technique. The C level rose significantly 60 min after the meal, reached a peak after 90 min, and had returned to the original level after 150 min. In contrast, the serum concentrations of CD and D displayed a significant rise by 30 min, reached a peak after 90 min, but had not returned to fasting levels after 150 min. The results suggest that there is considerable absorption of dihydroxy bile acids in the proximal small intestine in man.

0791 TRANSPORT OF α-AMYLASE ACROSS THE BASOLATERAL MEMBRANE OF THE PANCREATIC ACINAR CELL. (Eng.) Isenman, L. D.; Rothman, S. S. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *Proc. Natl. Acad. Sci.* 74(9): 4068-4072; 1977.

The flux of α-amylase (1,4-α-D-glucan glucanohydrolase; EC 3.2.1.1) across the basolateral membrane of the acinar cell was measured in the cell-to-bath direction using the whole rabbit pancreas in organ culture. This *in vitro* preparation is polarized so that apical and basolateral secretions can be collected separately. The unstimulated amylase flux from cell to bath was substantial at the initial rate (approximately 3 times the concurrent apical flux). With time, bath amylase approached a steady-state concentration, suggesting an equilibrating process. During the same time interval, ductal amylase secretion remained constant. At the steady state, the amylase concentration in the bath was at least an order of magnitude less than its ductal concentration. Hourly replacement of bathing medium reproduced the initial rate of amylase release into the bath for five consecutive hours. Pancreozymin (cholecystokinin) did not alter the steady-state bath amylase content, although it greatly augmented ductal amylase secretion. In contrast, acetyl-β-methyl-choline chloride greatly increased both the flux from the cell to bath and the ductal secretion of amylase. The results indicate a natural bidirectional permeability of the basolateral membrane to digestive enzyme. The results also support evidence previously obtained, which suggested that such a permeability might exist and that these fluxes are all related by a cytoplasmic pool (or pools) of digestive enzyme that acts as both a source of and a repository for enzyme crossing the membrane.

0792 ABSORPTION OF HORSERADISH PEROXIDASE BY NEONATAL PIG INTESTINAL EPITHELIUM. EFFECT OF Escherichia coli (O55B5) ON ABSORPTION. (Eng.) Staley, T. E. (Coll. Veterinary Medicine, Stillwater, OK 74074). *Am. J. Vet. Res.* 38(9): 1307-1314; 1977.

The pathway of macromolecular transport through the neonatal pig small intestinal epithelium following the adherence of *Escherichia coli* to the apical ends of enterocytes (monocontamination) was examined and compared with transport in unexposed (sterile) controls, utilizing the cytochemical marker horseradish peroxidase (HRP). In control animals, the marker was adsorbed to apical microvilli inside apical tubules and filling cytoplasmic vacuoles of the enterocytes. Extracellular absorbed marker assumed a spherical appearance within the subepithelial spaces but was dispersed within the capillary lumens. Uptake of HRP into the enterocyte occurred in 48-hr-old neonatal pigs, but transport into the circulation was not observed. Exposure to *E. coli* was accomplished by the intragastric administration of about 1 g of organisms/kg body weight. Adherence of *E. coli* to the surface of the ileal enterocyte did not totally inhibit HRP uptake. The *E. coli* that adhered to the surface of the enterocyte or that were seen within intercellular vacuoles appeared to be static since they were not involved in the transepithelial migration of envacuolated HRP.

0793 STUDIES ON TRANSLOCATION OF IMMUNOGLOBULINS ACROSS INTESTINAL EPITHELIUM. I. IMPROVEMENTS IN THE PEROXIDASE-LABELED ANTIBODY METHOD FOR APPLICATION TO STUDY OF HUMAN INTESTINAL MUCOSA. (Eng.) Isobe, Y.; Chen, S. T.; Nakane, P. K.; Brown, W. R. (Denver Veterans Admin. Hosp., 1055 Clermont St., Denver, CO 80220). *Acta Histochem. Cytochem.* 10(2):161-171; 1977.

The peroxidase-labeled antibody method was adapted for the localization of immunoglobulins and the secretory component in human intestinal mucosa by light and electron microscopy. Modifications of the method included (1) the use of digitonin in the first wash step of tissues fixed in periodate-lysine-paraformaldehyde, (2) double coating of glass slides with gelatin and egg albumin before application of cryostat sections, and (3) inactivation of endogenous peroxidase by periodic acid treatment of cryostat sections. With these improvements, tissue morphology was well preserved, antigenicity of immunoglobulins and the secretory component was retained, penetration of labeled antibodies into cellular compartments was complete, and confusion at the light microscopic level between peroxidase-containing cells and cells stained with peroxidase-labeled antibodies was avoided.

0794 EFFECTS OF 1α,25-,24r,25- AND 1α,24r,25-HYDROXYLATED METABOLITES OF VITAMIN D$_3$ ON CALCIUM AND PHOSPHATE ABSORPTION BY DUODENUM FROM INTACT AND NEPHRECTOMIZED RATS. (Eng.) Walling, M. W.; Hartenbower, D. L.; Coburn, J. W.; Norman, A. W. (Veterans Admin. Wadsworth Hosp. Center, Riverside, CA 92502). *Arch. Biochem. Biophys.* 182(1):251-257; 1977.

The effects of 1α,25-dihydroxyvitamin D$_3$, 24*R*,25-dihydroxyvitamin D$_3$, and 1α,24*R*,25-trihydroxyvitamin D$_3$ on active calcium and phosphate transport by rat duodenum were studied in sham-operated and bilaterally nephrectomized vitamin D-deficient rats. Both 1α,25-dihydroxy- and 1α,24*R*,25-trihydroxyvitamin D$_3$ markedly stimulated calcium and phosphate absorption with similar effects in sham-operated and nephrectomized rats. A 10-fold higher dose of 24*R*,25-dihydroxyvitamin D$_3$ was required for an equivalent stimulation of absorption in sham-operated rats, and this compound had no effect on duodena from nephrectomized rats. These data provide the first evidence that 24*R*,25-dihydroxy- and 1α,24*R*,25-trihydroxyvitamin D$_3$ can stimulate the active intestinal absorption of phosphate. The lack of response to 24*R*,25-dihydroxyvitamin D$_3$ in nephrectomized rats confirms prior results that indicated that renal metabolism of this secosteroid to 1α,24,25-trihydroxyvitamin D$_3$ is required for biological activity. These experiments provide a simple bioassay technique that apparently reflects the changes in duodenal calcium and phosphate absorption that occur under more rigorous short-circuited conditions and, in particular, can be used for screening putative 1α-hydroxyl analogs of vitamin D in nephrectomized rats.

0795 INTRACELLULAR IRON TRANSPORT IN RAT INTESTINAL EPITHELIUM: BIOCHEMICAL AND ULTRASTRUCTURAL OBSERVATIONS. (Eng.) Humphrys, J.; Walpole, B.; Worwood, M. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff CF4 4XW, Wales). *Br. J. Haematol.* 36(2):209-217; 1977.

Iron absorption by the intestinal epithelial cells was studied in male Wistar rats, using differential centrifugation of mucosal homogenates and electron microscope autoradiography. The maximum concentration of ^{55}Fe (62% of ^{55}Fe in the homogenate) was found 1 hr after intragastric administration. The maximum concentration of ^{55}Fe was found in the mitochondrial fraction after 18 hr. The mitochondrial, lysosomal, and microsomal fractions were examined by electron microscopy after autoradiography. One hour after the administration of ^{55}Fe, grains were associated with all the cell organelles, but in particular with microsomal vesicles. Eighteen hours after ^{55}Fe administration, the majority of the grains were associated with mitochondria; approximately 3% of the mitochondria contained one or more grains 18 hr after administration, demonstrating that the radioactivity in the mitochondrial fraction was associated with mitochondria and not with the other organelles contaminating this fraction. Sections of small intestine were taken 10, 20, and 30 cm from the pylorus. One hour after ^{55}Fe feeding, grains were found over the brush border, terminal web, and lateral cell membrane in the segment 10 cm from the pylorus. Thirty-two percent of the grains were found in the supranuclear regions of cells but were not associated with any particular membranes. At 20 cm, fewer grains were found, but a higher proportion were seen over the brush border and terminal web and a lower proportion over the lateral cell membrane. At 30 cm even fewer grains were seen, and these were distributed throughout the cell constituents. Eighteen hours after iron administration, few grains were present in the 10-cm segment. More were found in the 20-cm segment, 34% being located over mitochondria. The 30-cm segment showed many grains concentrated over mitochondria, endoplasmic reticulum, and ribosomes. The results suggest that mitochondria play a quantitatively significant role in iron metabolism within the epithelial cell but do not take part in the transport of iron across the cell during iron absorption.

0796 THE AGE-DEPENDENCE OF INTESTINAL ABSORPTION USING D-XYLOSE AS AN EXAMPLE. (Eng.) Heimann, G.; Roth, B.; Gladtke, E. (Children's Hosp., Joseph-Stelzmann-Strasse 9, D-5000 Koln 41, W. Germany). *Eur. J. Pediatr.* 124(4):285-294; 1977.

The effects of age and of changes in intestinal motility on absorption were studied in 40 infants. The serum concentrations of D-xylose were measured from capillary blood samples up to 300 min after the p.o. administration of D-xylose (0.5 g/kg). The absorption kinetics were calculated by a digital computer program. Infants up to the age of 2 months had lower maximal serum concentrations compared to older infants, because of a larger volume of distribution. The rate constant of invasion (k_1), which serves as a measure for the rate of intestinal absorption, and the rate constant of elimination (k_2) were significantly lower in infants up to the age of 2 months compared to older infants. The quotient of k_1/k_2 was independent of age. The time it took to reach maximal serum concentration was significantly longer in the young infants. The administration of metoclopramide (0.5 mg/kg) simultaneously with D-xylose demonstrated that the slower motility of the gastrointestinal tract in newborns and young infants is not exclusively responsible for the slower rate of D-xylose absorption. Experiments in which 26 infants received D-xylose (0.3 or 0.5 g) suggested that absorption involves saturation kinetics.

0797 ABSORPTION, AND EFFECT ON GASTRIC MUCOSA, OF BUFFERED AND NON-BUFFERED TABLETS OF ACETYLSALICYLIC ACID.

(Eng.) Linnoila, M.; Lehtola, J. (Duke Univ. Medical Center, Box 2921, Durham, NC 27710). *Int. J. Clin. Pharmacol. Biopharm.* 15(2):61-64; 1977.

The effects of buffered and nonbuffered acetylsalicylic acid tablets on the gastric mucosa and on gastric distress were investigated in 12 healthy subjects and in 42 rheumatoid arthritic patients, resp. The 12 healthy subjects received either acetylsalicylic acid (500 mg), acetylsalicylic acid buffered with magnesium oxide (175 mg), or acetylsalicylic acid buffered with magnesium oxide (100 mg) and aluminum aminoacetate (75 mg). One hour after the administration of the tablets, the acetylsalicylic acid level in the serum was significantly higher for the nonbuffered preparation than for the buffered preparation. Two hours after administration, this situation was reversed. However, the absolute means at any point in time differed by less than 2 µg. The serum salicylic acid levels were significantly higher 30, 60, and 90 min after the administration of the tablets buffered with magnesium oxide than after the other two types of tablets ($p<0.05$). In six healthy subjects in whom gastroscopy was carried out before and after 8 days of treatment with the preparations, gastric mucosal damage tended to be milder after the preparation buffered with magnesium oxide than after the nonbuffered preparation. Subjective feeling of gastric distress was observed in the 42 arthritic patients as often after buffered tablets as after nonbuffered tablets. These studies show that the absorption of salicylic acid is not affected in clinically significant amounts by buffering the tablets.

0798 THE DISPOSITION OF RADIOACTIVITY AFTER ADMINISTRATION OF THE ANTHELMINTHIC METHYL-^{14}C-5-CYCLOPROPYLCARBONYL-2-BENZIMIDAZOLE CARBAMATE (CICLOBENDAZOLE) TO RATS AND DOGS.

(Eng.) Brodie, R. R.; Mayo, B. C.; Chasseaud, L. F.; Hawkins, D. R. (Dept. Metabolism and Pharmacokinetics, Huntingdon Res. Center, Huntingdon, England). *Drug Res.* 27 (3):593-598; 1977.

The disposition of radioactivity was studied in rats and dogs after administration of a new anthelmintic agent, ^{14}C-labeled methyl-5-cyclopropylcarbonyl-2-benzimidazole carbamate (^{14}C-ciclobendazole). After a p.o. dose of ^{14}C-ciclobendazole (4 mg/kg) to rats, about 70% and 20% of the dose was excreted in the feces and urine, resp., during 2 days. Bile duct cannulated rats excreted about 80% of the dose in 48-hr bile, about 2% in the feces, and about 10% in the urine, showing that the p.o. dose was well absorbed and that some enterohepatic circulation probably occurred. The excretion of radioactivity in the bile was less after i.v. administration. A p.o. dose of ^{14}C-ciclobendazole (4 mg/kg) to dogs was mainly eliminated during 2 days with about 80% of the dose in the feces and only about 10% in the urine. Anesthetized bile duct cannulated dogs excreted between 26% and 35% of a p.o. dose in the bile during 24 hr and up to 58% was absorbed at this time. There was no unusual accumulation or localization of radioactivity in the tissues of rats or dogs following single or multiple p.o. doses of the drug. The highest concentrations were present in the intestinal tract, liver, and kidneys. After p.o. administration of ^{14}C-ciclobendazole to rats at three different dose levels (4, 40, and 400 mg/kg), peak plasma levels occurred at 15-30 min and declined with similar half-lives (about 20 hr). Ciclobendazole absorption was probably dose-dependent, a lower proportion probably being absorbed at higher doses. After repeated daily p.o. dosing with ^{14}C-ciclobendazole (4 mg/kg), there were no significant changes in either the daily plasma concentrations or the biological half-life measured after the last dose, indicating that ciclobendazole probably did not induce or inhibit its own metabolism.

0799 ABSORPTION OF ^{14}C-BUMADIZONE-Ca AND ^{14}C-PHENYLBUTAZONE IN ISOLATED INTESTINAL SEGMENTS IN VITRO AND TIED-OFF GASTROINTESTINAL SECTIONS IN VIVO OF RATS AND GUINEA PIGS.

(Eng.) Seebald, H.; Forth, W. (Lehrstuhl fur Pharmakologie und Toxikologie, Ruhr Universitat, Postfach 10 21 48, D-4630 Bochum, W. Germany). *Drug Res.* 27(1):624-635; 1977.

The absorption of butylmalonic acid mono(1,2-diphenylhydrazide) (bumadizone) and its condensation product was investigated in intestinal segments of rats and guinea pigs *in vitro* and *in vivo*. ^{14}C-labeled bumadizone-Ca and phenylbutazone were administered. In isolated jejunal segments of rats and guinea pigs *in vitro*, the transfer and the uptake of bumadizone by tissue was proportional to the concentration administered on the mucosal side. Bumadizone (320 nmol/ml) slightly decreased the absorption of water and glucose. Phenylbutazone inhibited the absorption of water and glucose by rat jejunal segments at 174 nmol/ml or greater. Transfer and uptake of phenylbutazone by tissue was proportional only up to 174 nmol/ml. Beyond this concentration they decreased. In guinea pigs, transfer was only one-fourth, and uptake by tissue only one-half of that in rat jejunal segments. The *in vivo* rat jejunum was found to be the main site of absorption of both bumadizone and phenylbutazone. Absorption was nearly complete within 1 hr after administering a dose of 0.64 μmol. In guinea pigs it was incomplete and was only one-fourth to one-third of that in rats. In the stomach, ileum, and colon, 1.5 to 3 times as much phenylbutazone was absorbed, as compared with bumadizone. Due to higher solubility in aqueous fluids, the availability of bumadizone-Ca for absorption exceeded that of phenylbutazone (1.62-97.2 μmol). In experiments with isolated jejunal segments of rats and guinea pigs *in vitro*, the capability of the intestinal tissue to produce phenylbutazone from bumadizone was demonstrated. Within 2 hr, nearly 20% of the ^{14}C-bumadizone was converted into phenylbutazone in both rat and guinea pig segments after the administration of bumadizone (16 μmol/ml).

0800 QUANTITATIVE STUDIES IN VITRO ON UPTAKE AND ESTERIFICATION OF PALMITATE INTO HUMAN AND RAT JEJUNAL MUCOSA. (Eng.) Sueur, R.; Cerf, M.; Di Costanzo, G.; Debray, C. (Hopital Bichat, Universite Paris VII, 170, Boulevard Ney, F-75877 Paris Cedex 18, France). *Digestion* 15(1): 34-42; 1977.

Quantitative incorporation and esterification of (9-10) ^{3}H-palmitate into human jejunal mucosa was measured *in vitro* to develop a technique for the determination of the esterifying capacity of the human intestinal mucosa sufficiently reliable to be applied semi-routinely in various pathological conditions. The results of the study were compared with results obtained in everted rat intestinal rings. Rat everted jejunal segments and jejunal biopsies from six normal subjects and two patients with adult celiac disease were incubated at 37 C in 4 ml of micellar solution (10 μM/ml sodium taurocholate, 3.6 μM/ml labeled palmitic acid, and 5 μM/ml glucose made up in Krebs-Ringer phosphate buffer, pH 7.4, Ca^{2+} omitted). Palmitate incorporation into diglyceride (DG) in the rat was higher than that into triglyceride (TG) with a TG:DG ratio lower than 1. Incorporation into cholesterol esters (CE) and phospholipid (PL) was low. There was a low but significant incorporation into monoglyceride (MG). Free fatty acid (FFA) uptake was high. In human jejunum, palmitate incorporation into CE, PL, and MG was low, reaching apparently a steady state by 5 min of incubation. Incorporation into TG was high, with a TG:DG ratio of about 3:1. Uptake into FFA was lower in man than in the rat, although the dispersion of the results was great. In the patients with celiac disease, the uptake into FFA was similar to that in the normal subjects. The incorporation of palmitate into TG and DG was increased with a TG:DG ratio below 2:1. The incorporation into TG was increased by the addition of monoolein into the incubation medium, but the total palmitate uptake was unchanged.

0801 ABSORPTION OF PHARMACOLOGIC DOSES OF ZINC. (Eng.) Oelshlegel, F. J.; Brewer, G. J. (Univ. Mississippi Medical Center, Jackson, MS 39216). *Prog. Clin. Biol. Res.* 14:299-311; 1977.

Absorption of orally administered zinc in the form of zinc sulfate was studied in fasting normal subjects. Assays of blood taken 0-4 hr after a 110-mg dose of zinc sulfate (providing 25 mg zinc) demonstrated that zinc absorption varies greatly in individuals. Varying the doses from 12.5 mg to 50 mg of zinc demonstrated that the smaller dose is more efficiently absorbed. Also, to maintain elevated plasma levels of zinc, doses of zinc should not be administered more than 4 hr apart. Since zinc sulfate is not well tolerated, zinc was also administered in the form of acetate and carbonate salts. Plasma levels of zinc were identical after administration of 25 mg zinc as the acetate or as the sulfate, but significantly lower ($p<0.05$) after the carbonate than after the sulfate. The effect of a number of foods (including hamburger on a bun, celery, lemon, coffee, and milk) ingested with the zinc sulfate on plasma zinc levels was studied. Most foods inhibited zinc absorption with the exception of bacon, hamburger meat, and, possibly, soft drinks, tea, and apples. Apparently, many dietary components such as fiber, phytic acid, and calcium block zinc absorption and may lead to zinc deficiencies.

0802 WEAK ELECTROLYTE TRANSFER IN THE GUINEA PIG JEJUNUM: SECRETION OF TRIMETHOXYBENZOIC ACID. (Eng.) Kolassa, N.; Krivanek, P.; Turnheim, K. (Pharmakologisches Institut, Universitat Wien, Wahringerstrasse 13a, A-1090 Wien, Austria). *Naunyn Schmiedebergs Arch. Pharmacol.* 298(3):223-228; 1977.

0803 FURTHER STUDIES ON THE MECHANISM OF THE ABSORPTION OF ION PAIR COMPLEX FROM THE RAT SMALL INTESTINE. (Eng.) Nakamura, J.; Muranushi, N.; Kimura, T.; Muranishi, S.; Sezaki, H. (Faculty Pharmaceutical Sciences, Kyoto Univ., Yoshida Shimoadachi-cho, Sakyo-ku, Kyoto, Japan). *Chem. Pharm. Bull.* 25(5):851-858; 1977.

0804 NORMAL ABSORPTION. (Eng.) Sleisenger, M. H.; Brandborg, L. L. *In: Malabsorption*. Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 13:2-50; 1977.

0805 ABSORPTION OF VITAMIN B$_{12}$ AND IRON. (Eng.) Callender, S. T. *In: Topics in Gastroenterology*. Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):163-172; 1976.

0806 IN VIVO ACTIVATION ANALYSIS. (Eng.) Boddy, K. *In: Topics in Gastroenterology*. Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications): (4):273-288; 1976.

0807 RESORPTION OF LIPASE OF PANCREATIC ORIGIN FROM INTACT, FULLY DEVELOPED INTESTINE INTO THE DUODENAL LYMPH NODES. (Hun.) Papp, M.; Feher, S.; Folly, G.; Horvath, J.; Ormai, S. (Magyar Tudomanyos Akademia Kiserleti Orvostudomanyi Kutato Intezete, Hungary). *Orv. Hetil.* 118(24):1391-1393; 1977.

0808 HARMALINE, AN INHIBITOR OF INTESTINAL TRANSPORT PROCESSES ASSOCIATED WITH THE MIGRATION OF SODIUM IONS. (Fre.) Sepulveda, F. V.; Buclon, M.; Robinson, J. W. L. (Centre Hospitalier Universitaire Vaudois, 1011 Lausanne, Switzerland). *Gastroenterol. Clin. Biol.* 1(1):87-93; 1977.

0809 INVESTIGATIONS OF THE BIOAVAILABILITY OF IRON FROM BI- AND TRIVALENT IRON SALTS. (Ger.) Dietzfelbinger, H.; Kaboth, W. (Krankenhauses Munchen-Schwabing, Kolner Platz 1, D-8000 Munich 40, W. Germany). *Med. Klin.* 72(15):654-659; 1977.

0810 CHRONOBIOLOGICAL ASPECTS OF IRON METABOLISM. CLINICAL-THERAPEUTIC IMPLICATIONS. (Ita.) Tarquini, B. (Instituto di Semeiotica Medica, Universita, Florence, Italy). *Recent. Prog. Med. (Roma)* 62(2):159-180; 1977.

0811 METABOLISM AND PHARMOKINETICS OF PIPROZOLIN IN RAT, DOG AND MAN. FIRST COMMUNICATION: INVESTIGATIONS WITH THE RADIOACTIVE SUBSTANCE. (Ger.) Vollmer, K. O.; Hodenberg, A. V.; Poisson, A.; Bode, R.; Schauerte, E. (Godecke AG, Abteilung Biochemie, Mooswaldallee, 7800 Freiburg/Brsg., W. Germany). *Arzneim. Forsch.* 27(I, 2b):502-508; 1977.

0812 INHIBITION BY POLYVINYLPYRROLIDONE (PVP) OF GASTROINTESTINAL ABSORPTION OF SALICYCLIC ACID AND RELATED COMPOUNDS IN RATS AND ITS MECHANISM FROM THE POINT OF INTERMOLECULAR INTERACTION. (Jpn.) Okano, T.; Watanabe, Y.; Yoshimura, K. (Pharmaceutical Inst., Tohoku Univ., Aobayama, Sendai, 980, Japan). *J. Pharm. Soc. Jpn.* 96(12): 1432-1439; 1976.

0813 ABSORPTION OF CARBOHYDRATES AND LIPIDS IN THE ALLOGENEIC SMALL INTESTINE. (Rus.) Vinogradova, M. A.; Kirpatovsky, I. D.; Panichenko, V. F.; Lysenko, A. I. (Central Res. Inst. Gastroenterology, Patrice Lumumba Peoples' Friendship Univ., Moscow, USSR). *Biull. Eksp. Biol. Med.* 83(2): 153-156; 1977.

0814 EFFICACY AND ADAPTATION TO FOOD QUALITY OF STARCH-GLUCOSE CONVEYOR AFTER BILE-PANCREATIC DUCT LIGATION IN RATS. (Rus.) Loginov, G. I. (Andizhan Medical Inst., Andizhan, USSR). *Biull. Eksp. Biol. Med.* 83(4):406-408; 1977.

0815 MECHANISMS OF pH ADJUSTMENT BY THE JEJUNUM IN DOGS. INFLUENCES ON WATER, NaCl AND GLUCOSE ABSORPTION. (Fre.) Dolisi, C.; Ozon, C.; Soummer, A. M.; Ardisson, J. L. (Laboratoire de Physiologie, Faculte de Medecine, Avenue de Vallombrose, F 06034 Nice Cedex, France). *J. Physiol. (Paris)* 72(7):893-902; 1976.

0816 THE ENTEROCYTIC PHASE OF THE ABSORPTION OF TRIGLYCERIDES. (Fre.) Theodore, C.; Cerf, M. (Hopital Bichat, 170 boulevard Ney, F 75877 Paris Cedex 18, France). *Gastroenterol. Clin. Biol.* 1(4): 369-376; 1977.

0817 EXPLORATION OF INTESTINAL ABSORPTION. CRITICAL ASSESSMENT OF THE D-XYLOSE TEST. (Spa.) Aparisi-Quereda, L.; Rodrigo-Gomez, J. M.; Guix-Garcia, J.; Serra-Desfilis, M. A.; Del Olmo Puchalt, J. A.; Wassel, A. H. (Catedra de Patologia y Clinica Medicas "B", Facultad de Medicina, Universidad de Valencia, Valencia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(2):197-230; 1977.

0818 STUDY OF DIGESTIVE ABSORPTION IN GASTRECTOMIZED DOGS WITH AN INVERTED INTESTINAL SEGMENT. (Spa.) Rodriguez Montes, J. A.; Murillo, A.; Argelus, I. (Catedra I de Patologia y Clinica Quirurgicas, Universidad de Granada, Granada, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(2):123-128; 1977.

See also, 0823, 0843, 1000, 1016, 1033, 1035, 1070, 1235, 1252, 1627, 1632, 1637, 1661.

MOTILITY

0819 ROLE OF GASTRIN AND OTHER GASTROINTESTINAL HORMONES IN THE PATHOPHYSIOLOGY OF ACHALASIA OF THE ESOPHAGUS. (Eng.) Santoki, O. (Yamaguchi Univ. Sch. Medicine, Ube, Yamaguchi, 755, Japan). *Arch. Jpn. Chir.* 46(2):88-112; 1977.

The effects of gastrin, secretin, cholecystokinin-pancreozymin (CCK-PZ), and Mecholyl on the lower esophageal sphincter pressure (LESP) were investigated in normal dogs, dogs with experimental achalasia, and in seven patients with achalasia. Achalasia was produced in the dogs by the injection of a 5% phenol solution into the muscular layers of the lower esophagus. The i.v. administration of tetragastrin (0.5, 1.0, 2.0, 5.0, 7.5, and 10.0 μg/kg) in these dogs produced a dose-dependent increase in the LESP; this curve shifted to the left in comparison with that in normal dogs, with each dose of tetragastrin. After the administration of 5.0 μg/kg of tetragastrin in 10 dogs with achalasia and 9 normal dogs, the LESP increased from a mean resting pressure of 8.4 ± 0.50 cm H_2O to 65.0 ± 3.67 cm H_2O in the dogs with achalasia, while that in the normal dogs increased from a resting pressure of 7.0 ± 0.83 cm H_2O to 40.1 ± 2.33 cm H_2O. The pressure change in response to tetragastrin in the dogs with achalasia was thus significantly greater than that in the normal dogs ($p<0.01$). The i.v. injection of secretin (5 CHRU/kg/5 min) had no significant effect on the resting LESP in normal and dogs with achalasia. The increase in LESP seen after tetragastrin was inhibited by a background dose of secretin in both normal and in dogs with achalasia. However, the percent reduction in the dogs with achalasia was not significantly different from that in the normal dogs, suggesting that the effect of secretin was not related to the destruction or degeneration of Auerbach's plexus. The injection of CCK-PZ (2.5 CHRU/kg, i.v.) increased the LESP in both normal and dogs with achalasia, and the response was significantly greater in the latter. The i.m. injection of Mecholyl (10 mg) produced an increase of 29.3 ± 2.75 cm H_2O in the normal dogs and an increase of 72.4 ± 3.80 cm H_2O in the dogs with achalasia ($p<0.01$). The gastrin levels were high in dogs treated with Mecholyl, suggesting that the LESP response may be partially mediated by the release of endogenous gastrin. In the human patients, the LESP increased significantly in response to 5 μg/kg of tetragastrin. This finding indicates that the LESP response to tetragastrin is useful in the preoperative diagnosis of achalasia.

0820 THE EFFECTS OF TRANSECTIONS ON THE BASIC ELECTRICAL RHYTHM IN THE CANINE JEJUNUM.

(Eng.) Mendel, C.; Pousse, A.; Dauchel, J.; Schang, J. C.; Grentier, J. F. (Unite de Recherche 61 de l'INSERM, Strasbourg-Hautepierre, France). *Eur. Surg. Res.* 8(6):528-535; 1976.

The effects of transection on the electrophysiology of the canine jejunum were studied. The basic electrical rhythm (BER) was studied *in situ* in 14 anesthetized dogs by the means of six monopolar electrodes. The BER frequency was measured in the intact intestine and after proximal and distal transections of the gut 5 cm apart from the electrodes. No significant differences were found between the BER frequencies recorded by each electrode, demonstrating the existence of a frequency plateau that remained after each transection. In the intact intestine the frequency in the plateau was 13.2 ± 0.3 cycles per minute (cpm). After the proximal transection, this frequency dropped to 12.0 ± 0.4 cpm ($p<0.05$) and, after the distal transection, it dropped to 10.9 ± 0.4 cpm ($p<0.05$). This last frequency change shows the influence of the distal intestine on the electrical behavior of the jejunum.

0821 GASTRIC EMPTYING AND SECRETION IN THE RHESUS MONKEY.

(Eng.) Dubois, A.; Natelson, B. H.; van Eerdewegh, P.; Gardner, J. D. (Natl. Inst. Arthritis, Metabolism, and Digestive Diseases, Bethesda, MD 20014). *Am. J. Physiol.* 232(2):E186-E192; 1977.

The volume and composition of the gastric contents as well as the rates of gastric emptying and gastric secretion were studied in the intact stomachs of eight conscious chair-adapted rhesus monkeys after fasting and after a liquid meal to investigate the physiologic variables that regulate gastric emptying and gastric secretion. Esophagotomies were prepared after 3 weeks of chair-adaptation, and experiments were begun 2-3 weeks later. Liquid meals (100 ml) were administered through a double-lumen sump tube passed into the stomach. Periodic aspiration of the gastric contents was carried out to measure gastric secretion by determining the rate of dilution of phenol red administered either separately after an overnight fast (5 ml, 280 mg/l, pH 7.4) or with the meal (40 mg/l, pH 7.4). Gastric emptying was similarly measured by the change in volume of the gastric contents. The mean intragastric volume during fasting was 8 ± 1 ml, and the fractional rate of emptying was 3.9 ± 0.6%/min or 0.31 ± 0.07 ml/min; the rate of water secretion was 0.33 ± 0.03 ml/min. The rates of ion secretion for hydrogen, sodium, potassium, and chloride were 29 ± 4, 18 ± 4, 8 ± 1, and 54 ± 9 μEq/min, resp. Instillation of a meal caused the fractional rate of emptying to increase rapidly to 17.6 ± 3.3%/min ($p<0.01$), return to the fasting level 10-40 min later, and then to increase again to 11.4 ± 2.9%/min ($p<0.02$). The rate of water secretion, following a similar time course, increased rapidly to 4.0 ± 0.6 ml/min ($p<0.001$), decreased to the fasting level 20-30 min later, and again increased significantly ($p<0.02$) 40-50 min after the meal. The hydrogen ion secretion showed a significant increase ($p<0.01$) approximately 10-30 min after the meal, as did the chloride secretion, which rose to 95-110 μEq/min. Potassium secretion increased to 12-18 μEq/min ($p<0.05$). The results demonstrate the complexity of gastric response to meal-stimulation and comprise the first study in which gastric emptying and secretion are determined simultaneously in conscious chair-adapted primates.

0822 HUMAN LOWER ESOPHAGEAL SPHINCTER (LES) RESPONSE TO SUBMAXIMAL AND MAXIMAL EFFECTIVE DOSES OF SYNTHETIC HUMAN GASTRIN I (G-17) IS NOT INHIBITED BY ATROPINE [Abstract].

(Eng.) Jensen, D. M.; McCallum, R. W.; Walsh, J. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1076; 1977.

0823 RELATIONSHIP BETWEEN INTESTINAL MOTILITY AND INTESTINAL ABSORPTION.

(Fre.) Matuchansky, C.; Rambaud, J. C.; Modigliani, R.; Bernier, J. J. (Service de Gastroenterologie, Hotel-Dieu, F 86021 Poitiers, France). *Gastroenterol. Clin. Biol.* 1(3):225-229; 1977.

0824 ROLE OF THE DUODENUM AND ANTRUM IN THE REGULATION OF THE PRESSURE OF THE LOWER ESOPHAGEAL SPHINCTER IN THE DOG. (Ger.) Sauberli, H.; Largiader, F.; Koelz, H. R.; Hollinger, A.; Weber, A.; Siewert, R.; Blum, A. L. (Chirurgische Universitatsklinik A, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Helv. Chir. Acta* 43(5/6): 799-802; 1976.

0825 EXPERIMENTAL IMPROVED MODEL OF SMALL INTESTINAL ILEUS IN RABBIT AND A TRIAL OF ITS USE FOR MEASURING THE DURATION OF POSTOPERATIVE INTESTINAL PARALYSIS. (Pol.) Kurzbauer, R. (Z. Oddzialu Chirurgicznego Zespolu Opieki Zdrowotnej w Prudniku, Prudnik, Poland). *Pol. Przegl. Chir.* 49(4):419-423; 1977.

0826 MOTILITY OF THE COLON. (Ger.) Wienbeck, M. (2. Medizin. Klinik und Poliklinik, Moorenstrasse 5, 4000 Dusseldorf 1, W. Germany). *Z. Gastroenterol.* 15(3):209-214; 1977.

0827 GASTRIC EMPTYING. (Ger.) Guller, R. (Kantonsspital Basel, Hebelstr. 1, CH-4056 Basel, Switzerland). *Z. Gastroenterol.* 15(3):185-191; 1977.

0828 GASTRIC MOTILITY AND LYSPAFEN® (PENTAPIPERIDE). (Ger.) Kimmig, J. M.; Heinkel, K.; Ensslin, H. (Medizinische Klink, Krankenhaus Stuttgart-Bad Cannstatt, Priessnitzweg 24, D-7000 Stuttgart 50, W. Germany). *Z. Gastroenterol.* 14(5):531-535; 1976.

0829 RESTORATION OF THE ELECTRICAL ACTIVITY AND INTRAMURAL NERVE APPARATUS AFTER STOMACH WALL TRANSECTION IN THE DOG. (Rus.) Solovieva, I. A.; Atanassova, E. (Pavlov's Inst. Physiology, Acad. Sciences USSR, Leningrad, USSR). *Fiziol. Zh. SSSR* 63(5):723-734; 1977.

0830 PYLORIC SPHINCTER DISCRIMINATING ABILITY WITH RESPECT TO SOLID PARTICLES OF THE GASTRIC CONTENT. (Ukr.) Kharchenko, N. M. (Inst. Physiology, Kiev Univ., Kiev, USSR). *Fiziol. Zh.* 22(4):505-509; 1976.

0831 PERIPHERAL MECHANISMS OF THE SMALL INTESTINE CAPACITANCE VESSEL RESPONSES TO NORADRENALIN. (Rus.) Kudriashov, Yu. A. (Inst. Experimental Medicine, Acad. Medical Science USSR, Leningrad, USSR). *Fiziol. Zh. SSSR* 63(4): 557-564; 1977.

See also, 0788, 0834, 0855, 1062, 1071, 1098, 1105, 1161, 1199, 1280, 1282, 1637, 1673.

SECRETION AND METABOLISM

0832 ACTION OF TESTOSTERONE ON THE DIFFERENTIATION AND SECRETORY ACTIVITY OF A TARGET ORGAN: THE SUBMAXILLARY GLAND OF THE MOUSE. (Eng.) Chretien, M. (Departement de Biologie, Centre d'Etudes Nucleaires de Saclay, Gif-sur-Yvette, France). *Int. Rev. Cytol.* 50:333-396; 1977.

0833 SALIVARY GLAND GLUCAGON: EFFECT OF AGE AND SEX [Abstract]. (Eng.) Kelly, J.; Paloyan, V.; Edwards, K.; Kisla, J.; Hojvat, S.; Lawrence, A. M. (Veterans Admin. Hosp., Hines, IL). *Clin. Res.* 25(4):572A; 1977.

0834 CAERULEIN (CERULETIDE). A REVIEW. (Eng.) Ganzina, F.; Santamaria, A. (Ric. Med. Farmitalia, Milan, Italy). *Acta Gastroenterol.* 39(5/6):169-185; 1976.

0835 ROLE OF THE KIDNEY IN GASTRIN METABOLISM. (Eng.) Yamagata, S.; Ishimori, A.; Sakurada, H.; *et al.* (Tohoku Univ., Sch. Medicine, Sendai, Japan). *Tohoku J. Exp. Med.* 118(Suppl.): 45-51; 1976.

See also, 1055, 1056, 1064, 1070.

SECRETION AND METABOLISM

Stomach

0836 METABOLIC MEMBRANE ASPECTS OF GASTRIC H^+ TRANSPORT. (Eng.) Sachs, G.; Ghang, H.; Rabon, E.; Shackman, R.; Sarau, H. M.; Saccomani, G. (Univ. Alabama Medical Sch., University Station, Birmingham, AL 35294). *Gastroenterology* 73(4):931-940; 1977.

Information concerning the acid secretory response of the parietal cell to changes of second messengers (i.e., Ca^{2+}, cyclic AMP, or some unknown component) is reviewed. Metabolic properties of dog gastric mucosa, investigated by substrate level measurements, implicate the Krebs cycle as the major energy-yielding metabolic pathway, but are equivocal in terms of an ATP-based H$^+$ secretion. Purification of gastric membranes by centrifugation and free flow electrophoresis results in a class of membrane vesicles enriched in K$^+$-ATPase and capable of ATP-energized H$^+$ uptake. Immunohistochemistry shows these to be derived from the parietal cell. H$^+$ uptake by the vesicles is accompanied by K$^+$ efflux, and movement of either ion is not potential-coupled. The simplest interpretation of these transport studies is uptake of KCl by the vesicles by passive diffusion followed by active H$^+$:K$^+$ exchange. In some respects, however, this model fails to conform to the expectations from *in vitro* studies. It may be, therefore, that another pump (i.e., redox) or another membrane component (i.e., Cl$^-$ conductance) is lost during purification. The properties of the vesicles are such, however, as to establish their role in H$^+$ secretion by the stomach.

0837 IN VITRO RELEASE OF GASTRIN FROM ISOLATED PERFUSED ANTRUM.

(Eng.) Dretler, R.; Wesdorp, R. I.; Fischer, J. E.; Soeters, P. B.; Ebeid, A. M. (Harvard Medical Sch., Boston, MA 02114). *Am. J. Surg.* 134(2):237-241; 1977.

An isolated rat gastric antrum preparation is described that may be useful in the study of the physiology of gastrin. Gastrin antra were removed from fasting female Sprague-Dawley rats and placed in a 2-ml perfusion chamber. Reservoir bottles containing oxygenated Krebs-Ringer's A solution either as control perfusion solution or with added agent to be tested were connected to the perfusion chamber by tubes that passed through glass-jacketed heat exchange systems. Flow rate was regulated by a perfusion pump, usually at the rate of 30 ml/hr. Gastrin secretion was measured by radioimmunoassay after perfusion of the gastric antra with 50 mM acetylcholine (+ 0.1 mM eserine to prevent destruction of acetylcholine by cholinesterase), 50 mM glycine, or 30 mM or 10 mM calcium chloride added to the perfusion solution. Gastrin secretion showed a biphasic response to stimulation by acetylcholine and a single phase response to glycine and calcium chloride stimulation. Gastrin secretion from minced rather than intact antra perfused with acetylcholine showed a similar biphasic response. The biphasic release of gastrin after acetylcholine administration suggests that antral gastrin may exist in two cell populations, one of which is more accessible than the other. It is concluded that the described preparation simplifies the study of antral gastrin release, eliminating many of the inhibitory feedback mechanisms.

0838 INHIBITION OF GASTRIN RELEASE AND GASTRIC SECRETION OF ACID.

(Eng.) Stadil, F.; Rehfeld, J. F.; Christensen, K. C.; Christiansen, J.; Dano, P.; Stage, J. G. (Rigshospitalet, 2100 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(42):25-35; 1977.

Recent studies on gastrin that are relevant to the inhibition of gastric acid secretion are summarized to provide a better understanding of the physiologic mechanisms involved. A number of physiologic systems for nervous and humoral inhibition of the secretion of gastric acid and release of gastrin are discussed. Vagal activation of the stomach, which may be cholinergic or noncholinergic, has been described in relation to the effects of epinephrine, norepinephrine, beta-adrenergic blockade, and vagotomy. The effect of diverting the gastric juice from the stomach during insulin stimulation and continuous aspiration of gastric juice are discussed. Intestinal influences, both stimulatory and inhibitory, on gastric acid secretion are presented. The intestinal actions were studied by experiments with intestinal bypass operations and on the effects of secretin, fat, and glucose administration. Intestinal inhibitors are the more important factors in gastric acid secretion and gastrin release. It is suggested that identification of these humoral inhibitors may give a better understanding of the physiologic mechanism involved.

0839 ACID HYDROLASES: ASSAY OF ACTIVITY AND LATENCY IN THE VARIED MIXED CELL POPULATIONS OF CANINE GASTRIC MUCOSA.

(Eng.) Boutros, M. I. R.; Waldron-Edward, D. (Div. Surgical Res., McGill Univ., Montreal, Quebec H3C 3G1, Canada). *Lab. Invest.* 36(4):436-443; 1977.

The specific enzymic properties, membrane or particle binding capacities, and the total activities of acid hydrolases were compared in normal canine antral and fundic mucosae and in liver. Basing each level of activity on tissue content of either protein or DNA, most of the enzymes were higher in the antrum than in the fundus, indicating that the normal, internal "digestive" or autophagic processes of the antral mucosa, with its preponderance of mucin-producing cells, are more pronounced than in the main body of the gastric mucosa. Acid phosphatase, α-galactosidase, β-galactosidase, and α-fucosidase showed differences in pH profile. In both fundic and antral tissues, acid phosphatase, although sharing the same peak of maximal activity at pH 4.8, showed a broad band of high activity in the fundic mucosa. An extra acidic peak of α-fucosidase at pH 3.3 was found in the antrum only. The specific activities of acid *p*-nitrophenylphosphatase, β-*N*-acetylglucosaminidase, α-galactosidase, arylsulfatase, α-fucosidase, and cathepsin D in the antrum (29 ± 14, 35 ± 2, 1.0 ± 0.3, 6.0 ± 0.5, 4.5 ± 0.8, and 357 ± 99 nmol/min/mg protein, resp.) were higher than those in the liver (20 ± 2, 19 ± 1, 0.39 ± 0.11, 2.7 ± 0.2, and 33 ± 2, resp., with no value given for arylsulfatase), whereas the activities of antral β-*N*-acetylgalactosaminidase, β-galactosidase, and mitochondrial succinate dehydrogenase were lower (2.1 ± 0.4 versus 2.8 ± 0.2, 2.1 ± 0.2 versus 2.9 ± 0.2, and 5.3 ± 1.6 versus 23 ± 5 nmol/min/mg, resp.). The fundic mucosa showed enzyme levels close to those of the liver with the exception of α-fucosidase, which was significantly lower than that in the liver. The high specific activity of cathepsin D in both the antrum and fundus, compared with that in the liver, suggests that the lysosomal enzymes in the canine mucosa may have a special function.

0840 CYCLIC AMP AND CYCLIC GMP IN THE RAT GASTRIC MUCOSA: THE SIGNIFICANCE OF POST MORTEM CHANGES AND TISSUE FIXATION ON THE ESTIMATION OF THE IN VIVO LEVEL. (Eng.) Ruoff, H. J. (Pharmakologisches Institut der Universitat Tubingen, Wilhelmstrasse 56, D-7400 Tubingen, W. Germany). *Naunyn Schmiedebergs Arch. Pharmacol.* 298(2):167-173; 1977.

The effects of tissue fixation and post-mortem changes on estimations of the *in vivo* levels of cyclic (c)AMP and cGMP (guanosine monophosphate) in the gastric mucosa of the rat were investigated. The tissue was fixed with microwave (MW) irradiation (2.1 kW, 2.45 megaHz), and the influence of delayed inactivation of the mucosa on the activities of adenyl cyclase (AC) and phosphodiesterase (PDE), on the levels of cAMP and cGMP, and the effects of various drugs on the levels of cAMP and cGMP were investigated in 24-hr fasted female FW49 Biberach rats. MW irradiation rapidly inactivated AC and PDE activities; 75% and 0% of AC activity remained after 5 and 25 sec, resp., and 9% and 0% of PDE activity remained after 25 and 45 sec, resp. In rats killed by decapitation, the gastric mucosal cAMP concentration doubled within 2 min after death, and the cGMP level at first (5 sec) dropped by 50% and then rose to nearly the initial concentration; 50-sec exposure of living rats to MW irradiation prevented the change in cAMP concentration, but shorter MW exposures did not. Degradation of cAMP by the MW exposure did not occur. In rats killed by decapitation and then exposed to MW for 50 sec at 5, 10, 20, 30, 60, 120, and 480 sec post-mortem, the changes in cAMP and cGMP levels were similar to those in the decapitated rats not exposed to MW, the cAMP level at 2 min, 4 min, and 8 min being significantly elevated ($p<0.001$, $p<0.001$, $p<0.005$, resp.) and the cGMP concentration at 5 sec being significantly ($p<0.01$) decreased. Hence, although MW irradiation killed the rats in 1-2 sec, longer exposures were required for mucosal fixation. Therefore, measurements made after 50-sec exposures of living rats to MWs were defined as *in vivo* levels, and measurements made in tissue fixed by 50-sec MW treatment applied 2 min after decapitation were defined as post mortem levels. Theophylline (0-200 mg/kg, i.p.) increased the *in vivo* cAMP and cGMP levels and the post-mortem cAMP level markedly and in a dose dependent manner. The post-mortem cGMP level was increased only by the highest dose ($p<0.01$), suggesting degradation of cGMP in the presence of a PDE inhibitor. Adrenalin (2 mg/kg, i.p.) increased the *in vivo* and post-mortem cAMP and cGMP levels significantly ($p<0.005$, $p<0.05$, $p<0.01$, $p<0.01$, resp.). Adrenergic β-receptor blockade with propranolol (4 mg/kg, i.p.) prevented the post-mortem rise in cAMP level ($p<0.01$), while adrenergic α-receptor blockade with phenoxybenzamine (4 mg/kg, i.p.) enhanced it ($p<0.01$), but neither drug affected cGMP levels. In adrenalectomized rats, either with or without glucocorticoid substitution, the cAMP level did not change during the post-mortem period and was significantly ($p<0.02$) lower than in sham-operated controls. These data indicate that gastric mucosal cAMP formation after delayed tissue fixation is due to β-adrenoreceptor stimulation by endogenous adrenalin, and failure to employ an adequate tissue fixation technique falsifies the estimations of *in vivo* cAMP and cGMP levels by elevating cAMP and lowering cGMP concentrations, implying that various recently published studies may not accurately describe the *in vivo* condition of the rat gastric mucosa. The results indicate that MW irradiation is an efficient method for fixation of the rat gastric mucosa.

0841 EFFECTS OF ANTRAL ETHANOL ON GASTRIC ACID SECRETION, POTENTIAL DIFFERENCE, AND SERUM GASTRIN. (Eng.) Bo-Linn, G. W.; Shanbour, L. L. (Baylor Coll. Medicine, Houston, TX). *Proc. Soc. Exp. Biol. Med.* 155(4):594-598; 1977.

The effect of antral ethanol perfusion on canine gastric acid secretion and transmucosal potential difference was studied using an *in vivo*, chambered fundic segment and isolated antral pouch preparation with intact blood supply. The preparation was responsive to exogenous gastrin with pentagastrin infusion (6 µg/kg/hr) and to endogenous gastrin with acetylcholine chloride (0.5%) and glycine (1 M) perfusion of the antral pouch. The peripheral venous serum gastrin concentration increased in response to antral perfusion with glycine with a slight increase in fundic acid secretion. A small increase in peripheral serum gastrin without a corresponding increase in acid output occurred during antral perfusion with 20% ethanol. No significant differences were found in either potential difference or acid output between saline- and ethanol-treated groups, or between histamine- and histamine-plus-ethanol-treated groups. These data suggest that ethanol-stimulated antral gastrin release is insufficient to stimulate or potentiate gastric acid secretion during acute conditions in the anesthetized dog.

0842 INTRAGASTRIC TITRATION OF ACID IN THE PERFUSED RAT STOMACH PREPARATION FOLLOWING PARENTERAL AND INTRALUMINAL STIMULATION. (Eng.) Halter, F.; Galeazzi, R.; Leuenberger, J.; Smith, G. M. (Univ. Hosp., Inselspital, Berne, Switzerland). *Eur. J. Pharmacol.* 43(3):247-252; 1977.

To develop an animal model for the clinical study of gastric acid secretion, the anesthetized rat stomach preparation was adapted to assay intraluminally administered stimulants and inhibitors of acid secretion by continuously recirculating the perfusate (15 ml of 5% glucose) and measuring acid by the pH-stat technique. The responses obtained were linear. Continuous artificial neutralization of the stomach to pH 5.5 as well as variation of the pH between 6.5 and 4.0 did not significantly alter the sensitivity of the preparation to i.v. administered human gastrin-heptadecapeptide I (HG I). Basal acid secretion, however, significantly declined following stepwise lowering of the intragastric pH between 6.5 and 4.0. The threshold values for responses to i.v. HG I were below 16 ng. Six doses could be given per rat without tachyphylaxis. Acetylcholine (1.3, 2.5, 5.2, and 10.4 μg/ml) in the perfusate induced a dose-dependent linear ($r=0.902$) acid secretion. Metiamide (1.66 mg/ml) in the perfusate produced a parallel shift to the right of the HG I dose-response curve, producing an agonist dose ratio of 3.66. These data suggest that intragastrically applied stimulants and inhibitors of acid secretion can be studied precisely in this relatively simple preparation.

0843 GASTRIC SECRETORY EFFECT OF AMINO ACIDS GIVEN ENTERALLY AND PARENTERALLY IN DOGS.

(Eng.) Landor, J. H.; Ipapo, V. S. (CMDNJ-Rutgers Medical Sch., P.O. Box 101, Piscataway, NJ 08854). *Gastroenterology* 73(4):781-784; 1977.

To investigate the possibility that the products of protein digestion, when absorbed into the bloodstream, might stimulate gastric secretion, the possible gastric secretory effect of the parenteral administration of an amino acid (AA) mixture was determined, and this effect was compared with that produced by the enteral administration of a similar AA solution. Heidenhain pouches, gastrostomies, and Roux-en-Y jejunostomies were constructed in five mongrel dogs. A 3% solution of mixed amino acids was infused at a constant rate (120 ml/hr) throughout a 2-hr period either i.v. or intrajejunally, and the secretory response of the pouches was compared to that obtained during similar infusions of 0.9% NaCl. The i.v. administration of saline did not stimulate gastric secretion. The mean secretory responses were intrajejunal saline 37 μEq/2 hr; i.v. amino acids, 330 μEq/2 hr; and intrajejunal amino acids, 301 μEq/2 hr. These results suggest that amino acids, absorbed from the gut, may play a role in the stimulation of gastric secretion occurring when food passes through the intestine.

0844 EFFECT OF REPEATED ASPIRIN ADMINISTRATION ON THE GASTRIC MUCOSAL BARRIER AND CELL TURNOVER.

(Eng.) Bolton, J. P.; Cohen, M. M. (Dept. Surgery, Univ. British Columbia, 700 West 10th Ave., Vancouver, British Columbia, V5Z IL5, Canada). *J. Surg. Res.* 23(4):251-256; 1977.

The effect of repeated aspirin administration on the canine gastric mucosa was studied by measuring gastric mucosal permeability, blood loss, and cell turnover in Heidenhain pouches. Cell turnover in the aspirin-perfused pouches (20 mM for 3 hr) was increased over that in control perfusions after a lag phase, but this did not affect the increase in gastric mucosal permeability produced by the aspirin. The increase in cell turnover may account for the observed resistance to mucosal erosions that develops after repeated aspirin administration, but the continued presence of a damaged and leaky gastric mucosal barrier may account for the failure of mucosal resistance to confer significant benefit in the form of protection from the hemorrhagic consequences of aspirin ingestion.

0845 THE EFFECT OF CIMETIDINE ON BARIUM COATING OF THE GASTRIC MUCOSA.

(Eng.) James, W. B.; Stanton, B.; Teasdale, E.; McCreath, G. (Southern General Hosp., Glasgow G51 4TF, Scotland). *Br. J. Radiol.* 50(594):445-446; 1977.

The effect of cimetidine on gastric and duodenal mucosal coating by barium sulfate was investigated in 51 men referred for barium meal examination. The patients received two placebo or cimetidine tablets (400 mg) the night before the examination and two tablets (400 mg) 1 hr prior to the examination. The quality of mucosal coating in the stomach and duodenum was graded excellent, good, or poor by three observers. Although the numbers involved were too small for statistical consideration, there was judged to be no difference between the study and control groups in the quality of mucosal coating.

0846 CIMETIDINE AND THE GASTRIC MUCOSAL BARRIER

(Eng.) Kenyon, G. S.; Ansell, I. F.; Carter, D. C. (Edinburgh Univ. Medical Sch., Edinburgh, Scotland). *Gut* 18(8):631-635; 1977.

The effect of cimetidine on hydrogen and sodium transport across the gastric mucosa and its effect on taurocholate-induced permeability changes were studied in vagally-denervated pouches of antrectomized dogs. The topical or i.v. administration of cimetidine (200 mg) did not affect the net luminal Na$^+$ gain or net luminal H$^+$ loss in the pouches. The instillation of either 5 or 20 mM sodium taurocholate caused a significant increase in Na$^+$ net gain and H$^+$ net loss. The addition of 200 mg of cimetidin to either concentration of taurocholate or its administration i.v. before taurocholate administration did not reduce the net Na$^+$ gain or H$^+$ loss induced by taurocholate alone. In the case of 5 mM taurocholate cimetidine actually increased net H$^+$ loss ($p<0.001$). As a potent inhibitor of gastric secretion, cimetidin could prove valuable by reducing the amount of secreted H$^+$ ion available to exploit a mucosal barrier damaged by agents such as bile salts.

0847 AUGMENTED GASTRIC INHIBITORY POLYPEPTIDE RESPONSE TO INTRADUODENAL GLUCOSE BY EXOGENOUS GASTRIN AND CHOLECYSTOKININ.

(Eng.) Sirinek, K. R.; Cataland, S.; O'Dorisio, T. M.; Mazzaferri, E. L.; Crockett, S. E.; Pace, W. G. (Ohio State Univ. Coll. Medicine, 410 W. 10th Ave., Columbus, OH 43210). *Surgery* 82(4):438-442; 1977.

The effect of i.v. infusions of gastrin, pentagastrin, cholecystokinin, secretin, and glucagon on both fasting and glucose-stimulated gastric inhibitory polypeptide (GIP) concentrations was studied. Five conscious dogs with Mann-Bollman fistulas each underwent six daily studies in which 50 ml of 20% glucose was infused intraduodenally (i.d.) over a period of 10 min. In five of six studies, either gastrin, pentagastrin, cholecystokinin, secretin, or glucagon was infused i.v. for 30 min before and 120 min after i.d. administered glucose. Venous blood samples at 15-min intervals were assayed for immunoreactive gastric inhibitory peptide (GIP). The i.v. administration of gastrin, pentagastrin, cholecystokinin, secretin, and glucagon had no effect on fasting immunoreactive GIP (iGIP). Compared to fasting, iGIP was significantly ($p<0.05$) increased at 15, 30, and 45 min for all treatment groups. Compared to i.d. administered glucose alone, the GIP response following either i.v. gastrin plus i.d. glucose, i.v. pentagastrin plus i.d. glucose, or i.v. cholecystokinin plus i.d. glucose was significantly greater ($p<0.05$) at 5 and 15 min. This study demonstrates augmentation of glucose-stimulated GIP by the structurally similar peptides, gastrin, pentagastrin, and cholecystokinin, suggesting a physiological role for endogenous gastrin and cholecystokinin in modulating the GIP response to glucose.

0848 ACID SECRETORY RESPONSES TO HISTAMINE, PENTAGASTRIN, AND FEEDING BEFORE AND AFTER VAGAL DENERVATION OF FUNDIC POUCHES IN CATS.

(Eng.) Svensson, S. O.; Emas, S. (Karolinska Hosp., 104 01 Stockholm, Sweden). *Scand. J. Gastroenterol.* 12(3): 357-362; 1977.

The effect of local vagotomy of the fundic pouch on the acid secretory response to histamine, pentagastrin, and feeding was studied in cats. A gastric fistula (GF) of the innervated stomach, and a vagally innervated mucosal septal fundic pouch (Pavlov pouch, PP) were prepared in each of five adult cats at least 1 month prior to the experiments. Each experiment was repeated after converting the PP to a Heidenhain pouch (HP). Saline was infused i.v. (12.5 ml/hr) and histamine (10-640 µg/kg/hr) or pentagastrin (0.5-64 µg/kg/hr) was added to the infusion for 3 hr. Feeding experiments used a single meal of 3-50 g ground meat and were conducted without saline. Before denervation, the maximal response (MR) of the GF to histamine and pentagastrin was 1.04 ± 0.08 and 0.96 ± 0.05 mEq of acid/15 min, resp., and the dose-response (DR) curves levelled off at 160 and 8 µg/kg/hr for histamine and pentagastrin, resp. The D_{50} was 42 ± 9 and 2.6 ± 0.8 µg/kg/hr for histamine and pentagastrin, resp. Denervation did not affect these secretory parameters for histamine in the GF, but did elevate the MR ($p<0.01$) and lower the D_{50} ($p<0.01$) for pentagastrin. In the PP, the MR to histamine, pentagastrin, and feeding were approximately equal (0.36, 0.33, and 0.31 mEq/15 min, resp.); the DR curve plateaued at 160 and 32 µg/kg/hr of histamine and pentagastrin, resp., and at 12.5 g of meat. The D_{50} for histamine and pentagastrin was 29 ± 4 and 2.0 ± 0.7 µg/kg/hr, resp. Denervation to produce the HP markedly reduced the MR to histamine, pentagastrin, and feeding (0.20, 0.21, and 0.13 mEq/15 min, resp.); the DR curve plateau became variable for both histamine and pentagastrin and was markedly depressed for feeding; the D_{50} for histamine did not change (45 ± 6 µg/kg/hr), and was significantly ($p<0.05$) for pentagastrin. Denervation reduced the acid response to histamine by decreasing the secretory capacity, and to pentagastrin by decreasing both the secretory capacity and the sensitivity of the oxyntic glands (in this respect, the effect of local and truncal vagotomy is equal in cats). The reduction of the response to feeding was greater than to histamine or pentagastrin, which indicates that feeding does not release enough gastrin to induce the maximal rate of acid secretion in the absence of vagal impulses. But, because feeding and pentagastrin produced equal MR before denervation, it appears that vagal impulses during feeding produce greater enhancement than does basal vagal tone of the acid response to submaximal doses of gastrin.

0849 CHANGES IN PROTEIN AND NUCLEIC ACID SYNTHESIS IN RAT GASTRIC MUCOSA AFTER PENTAGASTRIN.

(Eng.) Enochs, M. R.; Johnson, L. R. (Dept. Physiology, Univ. Texas Medical Sch., Houston, TX 77030). *Am. J. Physiol.* 232(2):E223-E228; 1977.

Pentagastrin was administered to rats to determine the effect of a single dose of the substance on protein and nucleic acid syntheses in the gastric mucosa. Fasted rats received i.p. either 250 µg/kg of pentagastrin or an equal volume of saline at intervals from 0 to 24 hr prior to sacrifice. Tissue from the oxyntic gland area and the duodenum were then minced and incubated in a ^{14}C-amino acid mixture (2 µCi/ml) to measure *in vitro* amino acid incorporation. Amino acid incorporation into stomach tissue and duodenal protein was significantly elevated ($p<0.05$ and 0.025, resp.) by 6 hr, and the secreted protein was significantly less ($p<0.01$) than in controls. The inhibitory effect of actinomycin D on protein synthesis was tested by comparing the incorporation of ^{14}C-amino acids into oxyntic glandular mucosa in rats that had received i.p. injections of either actinomycin D (100 µg at 24 and 7 hr before sacrifice), pentagastrin (250 µg/kg at 6 hr before sacrifice), actinomycin D and pentagastrin (schedules as given for solo doses), or saline. Pentagastrin significantly ($p<0.005$) increased incorporation of label into total gastric mucosal protein; pentagastrin plus actinomycin D significantly decreased protein synthesis compared to controls ($p<0.001$); actinomycin D alone had no significant effect. The influence of pentagastrin on nucleic acid synthesis was measured by injecting rats with either 250 µg/kg of pentagastrin or with saline at various times before sacrifice; all animals received 200 µCi ^{3}H-orotic acid i.p. 2 hr prior to sacrifice. At 1 and 2 hr after its injection, pentagastrin significantly increased incorporation of ^{3}H-orotic acid into messenger RNA (from 0.45 and 0.39 to 0.72 and 0.55 disintegrations per min [dpm]/mg DNA, resp.). Pentagastrin also induced a biphasic increase in ribosomal RNA and transfer RNA that reached a maximum of 4.59 dpm/mg by 12 hr (control=2.82 dpm/mg). The results indicate that the main trophic effect of pentagastrin on rat gastric mucosa was an increase in protein synthesis, dependent on and preceded by increased RNA synthesis.

0850 INHIBITION OF GLUCOSAMINE SYNTHESIS BY SALICYLATES, HYDROCORTISONE AND TWO NON-ULCEROGENIC DRUGS.

(Eng.) Goodman, M. J.; Kent, P. W.; Truelove, S. C. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Arch. Int. Pharmacodyn.* 226(1):4-10; 1977.

Glucosamine synthesis in homogenates of human gastric and colonic mucosa was studied in the presence of the ulcerogenic drugs sodium salicylate, acetylsalicylic acid, and hydrocortisone hemisuccinate, and in the presence of the nonulcerogenic analgesic, paracetamol. The nonulcerogenic antibiotic, gentamicin, was tested for its effect upon glucosamine synthesis in a homogenate of human colonic mucosa. The homogenates (50 mg tissue/ml) were incubated in 1.0 ml volumes of substrate buffer mixture containing 1, 2, 5, or 10 mg of a drug (only 1, 2, or 5 mg for acetylsalicylic acid) 37 C for 3 hr. Concentrated perchloric acid (71%) was used to stop the reaction. After centrifugation, glucosamine was assayed by the Morgan-Elson color reaction. Dose-related inhibition of glucosamine synthesis was observed with each drug. Sodium salicylate, acetylsalicylic acid, and paracetamol produced 50% inhibition at concentrations of 27, 23, and 29 mM, resp., while hydrocortisone hemisuccinate produced 50% inhibition at 10 mM. Gentamicin inhibited glucosamine synthesis to approximately the same extent as the salicylates. The results indicate that the ulcerogenic actions of the salicylates and hydrocortisone hemisuccinate are not due to the inhibition of glucosamine synthesis in the mucosa.

0851 INHIBITION BY SOMATOSTATIN OF GASTRIN RELEASE AND GASTRIC ACID RESPONSES TO MEALS AND TO PENTAGASTRIN IN MAN.

(Eng.) Phillip, J.; Domschke, S.; Domschke, W.; Urbach, H. J.; Reiss, M.; Demling, L. (Dept. Medicine, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Scand. J. Gastroenterol.* 12(3):261-265; 1977.

Somatostatin was administered i.v. to six healthy male volunteers to investigate its effect on meal- and pentagastrin-induced acid secretion and gastrin release. Somatostatin (5 µg/kg/hr, cyclic form) was administered during the second hour of a 3-hr period of stimulation with either pentagastrin (1.5 µg/kg/hr, i.v.) or a test meal (10% peptone, pH 5.5). A modified Fordtran and Walsh method of intragastric titration was used to determine meal-induced gastric acid secretion. Somatostatin decreased the pentagastrin-induced acid response achieved by the first hour of stimulation by 68 ± 17% ($p<0.001$) and by 87 ± 2% ($p<0.001$) during the last 30 min of somatostatin infusion. The total 1-hr pepsin output was decreased by 72 ± 14% ($p<0.001$) and by 84 ± 2% ($p<0.001$) during the last 30 min. The total 1-hr meal-induced acid secretion was reduced by 75 ± 21% ($p<0.001$) by somatostatin (by 96 ± 3% [$p<0.001$] during the last 30 min of infusion). Meal-stimulated gastrin levels, nearly twice the fasting levels, were decreased only 27 ± 9% ($p<0.02$) even during the second 30 min of infusion. The results suggest that somatostatin inhibits meal-induced acid secretion mainly by a direct effect on the parietal cells and only partially by indirect inhibition via suppression of gastrin release.

0852 EFFECT OF SOMATOSTATIN ON GASTROINTESTINAL SECRETIONS AND PEPTIC ULCER PRODUCTION IN CATS.

(Eng.) Konturek, S. J.; Radecki, T.; Pucher, A.; Coy, D. H.; Schally, A. V. (Inst. Physiology, Medical Acad., Krakow, Poland). *Scand. J. Gastroenterol.* 12(3):379-383; 1977.

Somatostatin (GH-RIH) was infused i.v. into conscious cats to study its effect on gastric and pancreatic secretion and the formation of peptic ulcers. Chronic gastric and pancreatic fistulas were prepared in six cats, and a gastric (pentagastrin or histamine, i.v.) or pancreatic (secretin, i.v. or intraduodenal acid) stimulant was administered to produce maximal secretion. After 90 min of secretory stimulation, GH-RIH (0.62-5.0 µg/kg/hr) was infused i.v. for 1 hr, followed by an additional 60-min administration of the stimulant. Peptic ulcer formation was studied in 48 cats after a 36-hr perfusion with one of the following solutions: histamine (160 µg/kg/hr) or pentagastrin (8 µg/kg/hr) alone or with GH-RIH (2 µg/kg/hr). GH-RIH produced a dose-related inhibition of pentagastrin-stimulated acid secretion, reaching approximately 50% inhibition at a dose of 2 µg/kg/hr. Pepsin inhibition was about 90% at 1 µg/kg/hr of GH-RIH, but was not dose-related. GH-RIH had no effect on histamine-stimulated acid output, but did significantly decrease pepsin output. GH-RIH (2 µg/kg/hr) almost completely inhibited secretin-stimulated pancreatic bicarbonate secretion, and strongly inhibited bicarbonate secretion stimulated by intraduodenal acid, but did not affect protein secretion induced by either stimulant. GH-RIH significantly reduced the incidence and size of duodenal ulcers induced by pentagastrin. Peptic ulcers and related complications were also decreased by GH-RIH. It is concluded that GH-RIH may directly affect the oxyntic glands, but not the histamine receptors. Furthermore, GH-RIH may be useful in treatment of peptic ulcers in man.

0853 EFFECT OF SOMATOSTATIN ANALOGS ON GASTRIC AND PANCREATIC SECRETION.

(Eng.) Konturek, S. J.; Tasler, J.; Krol, R.; Dembinski, A.; Coy, D. H.; Schally, A. V. (Medical Acad., Krakow, Poland). *Proc. Soc. Exp. Biol. Med.* 155(4):519-522; 1977.

Somatostatin and its two analogs, D-^{8}Trp-somatostatin and D-^{14}Cys-somatostatin were tested for their effects on gastric and pancreatic secretion in chronic gastric and pancreatic fistula dogs. All three peptides, infused i.v. at 2.5 µg/kg/hr, caused similar competitive inhibition of pentagastrin-induced gastric acid and secretin-induced pancreatic bicarbonate secretions. During somatostatin infusion, the dose-response curve for acid secretion from the stomach was shifted to the right; there was an almost threefold increase in K_m, while V_{max} was only slightly decreased. The infusion of either analog produced a similar shift of the dose-response curve, a doubling of K_m, and a small reduction in V_{max}. Somatostatin and its analogs all shifted the dose-response curve for pancreatic bicarbonate secretion to the right, increased the K_m, and slightly reduced V_{max}. The results indicate that somatostatin analogs, which were shown to have a dissociated action on pituitary and endocrine pancreatic secretion, are essentially as equipotent as somatostatin itself on gastric and pancreatic secretions.

0854 ANTI-STRESS ULCER AND ANTI-SECRETORY EFFECT OF SOMATOSTATIN IN RATS--FAILURE TO SUPPRESS SERUM GASTRIN. (Eng.) Schwille, P. O.; Putz, F.; Thun, R.; Schellerer, W.; Draxler, G.; Lang, G. (Chirurgische Universitatsklinik, Maximiliansplatz D-8520 Erlangen, W. Germany). *Acta Hepatogastroenterol.* 24(4):259-265; 1977.

The effect of somatostatin on stress ulceration and on gastrin secretion was investigated in rats. Some rats were restrained so that free movement was restricted, while others were completely restrained. Complete restraint reduced the volume of gastric secretion, acid and pepsin secretion, the acid concentration, and aminopyrine clearance, while the ulcer index was elevated. During both types of restraint, somatostatin inhibited the volume and acid secretion in a dose-dependent manner and lowered the ulcer index. During continuous somatostatin infusion (10.0 μg/kg/hr, 8 hr), the acid concentration and acid and pepsin secretion fell. The ulcer index of gastric fistula in somatostatin-treated rats dropped to 50% of that in vehicle-treated controls. Microcirculation and serum gastrin levels were unchanged. In animals without gastric fistula, the ulcer index was reduced by 85%; the serum gastrin level was unchanged. It is concluded that stress ulcers develop at a low secretory and microcirculatory state of gastric mucosa. The prophylactic effect of somatostatin results from direct inhibition of parietal and chief cells.

0855 ACTION OF PROGLUMIDE ON GASTRIC ACID SECRETION AND MOTILITY STIMULATED BY PENTAGASTRIN IN THE NONANESTHETIZED CAT. (Fre.) Desvigne, C.; Vagne, M.; Faivre, M.; Desvigne, A. (Hopital E.-Herriot, Pavillon H, F 69374 Lyon Cedex 2, France). *Gastroenterol. Clin. Biol.* 1(5):447-454; 1977.

0856 CHOLESTEROL BIOSYNTHESIS IN STOMACH AND INTESTINE TISSUES OF RATS. (Ukr.) Nikolenko, I. A.; Perederij, O. F. (A. V. Palladin Inst. Biochemistry, Acad. Sciences, Kiev, Ukrainian SSR). *Ukr. Biokhim. Zh.* 49(5):70-75; 1977.

0857 GASTRIC ANTISECRETORY ACTIONS OF (15s) 15 METHYL PROSTAGLANDIN E_2 METHYL ESTER AND NATURAL PROSTAGLANDIN E_2 IN RHESUS MONKEYS. (Eng.) Dajani, E. Z.; Callison, D. A. (Searle Lab., Chicago, IL 60680). *Prostaglandins* 11(5):799-808; 1976.

0858 GASTROSCOPIC OBSERVATION OF THE EFFECT OF VARIOUS ANTIINFLAMMATORY DRUGS ON THE GASTRIC MUCOSA [Abstract]. (Eng.) Hradsky, M.; Bruce, L. (Falu Hosp., Falun, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):35; 1977.

0859 EFFECT OF IONIC STRENGTH ON THE PROTEOLYTIC CHARACTERISTICS OF HUMAN PEPSINS [Abstract]. (Eng.) Samloff, I. M.; Dadufalza, V. (Harbor General Hosp., Los Angeles, CA). *Gut* 18(11):A949-A950; 1977.

0860 ROLE OF CYCLIC 3',5'-AMP-DEPENDENT PHOSPHORYLATION OF MEMBRANE PROTEINS IN THE ACTIVATION OF OXYNTIC CELLS. (Eng.) Salganik, R. I. (Inst. Cytology, Genetics, Siberian Branch of the USSR Acad. Sciences, Novosibirsk, USSR). *Gastroenterology* 73(4, Part 2):920; 1977.

0861 INHIBITION OF BILE SALT-INDUCED GASTRIC MUCOSAL EROSIONS BY 16,16-DIMETHYL PROSTAGLANDIN E_2 IN THE RAT [Abstract]. (Eng.) Main, I. H. M.; Melarange, R. (Sch. Pharmacy, Univ. London, 29/39 Brunswick Square, London WC1N 1AX, England). *Br. J. Pharmacol.* 61(1):139P; 1977.

0862 EXPERIMENTAL GASTRIC ULCER BY INJECTION OF ACETIC ACID INTO THE GASTRIC WALL. (Jpn.) Oku, K. (Wakayama Medical Coll., Wakayama, Japan). *J. Wakayama Med. Soc.* 27(3):133-147; 1976.

0863 DUODENAL INHIBITION OF GASTRIN RELEASE IN DOGS [Abstract]. (Eng.) Rokkjaer, M.; Host, V.; Brandsborg, O. (Arhus Kommunehospital, Arhus, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):80; 1977.

0864 CHANGES IN GASTRIC MORPHOLOGY AND FUNCTIONS AFTER CORTICOSTEROID ADMINISTRATION IN DOGS [Abstract]. (Eng.) Holter, O.; Stave, R. (Natl. Hosp. Norway, Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):34; 1977.

0865 PLASMA GASTRIN AND GASTRIC SECRETORY RESPONSE TO DUODENAL PERFUSION WITH LIVER EXTRACT IN HEALTHY HUMAN SUBJECTS [Abstract]. (Eng.) Grabner, P.; Semb, L. S.; Schrumpf, E.; Myren, J.; (Diakonhjemmets Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):26; 1977.

0866 THE INHIBITORY EFFECT OF A SYMPATIC STIMULANT ON THE ACID SECRETION IN THE DOG [Abstract]. (Eng.) Gottrup, F.; Ornsholt, J.; Andersen, D. (Univ. Dept. Surgical Gastroenterology, Amtsygehuset, Aarhus, Denmark). *Gastroenterology* 12(Suppl. 45):25; 1977.

0867 EFFECT OF DOXEPIN ON GASTRIC SECRETION IN MAN [Abstract]. (Eng.) Giercksky, K. E.; Oyen, D.; Burhol, P. G.; Johnson, J. A. (Surgical Dept., Univ. Tromso, Tromso, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):23; 1977.

0868 FAT INDUCED JEJUNAL INHIBITION OF MEAL STIMULATED GASTRIC ACID SECRETION AND RELEASE OF GIP, GLUCAGON, GLI, AND VIP IN HEALTHY HUMAN SUBJECTS [Abstract]. (Eng.) Bech, A.; Christiansen, J.; Lauridsen, K.; Holst, J. J.; Fahrenkrug, J.; Schaffalitzky de Muckadell, O. (Glostrup Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):7; 1977.

0869 EFFECTS OF INTRAVENOUS CIMETIDINE ON GASTRIC SECRETION IN RESPONSE TO INTRAVENOUS HISTAMINE AND PENTAGASTRIN IN MAN [Abstract]. (Eng.) Aadland, E.; Berstad, A. (Aker Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45): 117; 1977.

0870 EFFECT OF SYMPATHIC NERVE BLOCKADE ON GASTRIC ACID SECRETION IN GUINEA PIGS [Abstract]. (Eng.) Aaraas, I.; Gauperaa, T. (Dept. Anaesthesiology, Univ. Tromso, Tromso, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45): 118; 1977.

0871 BETHANECHOL AND ATROPINE BOTH INHIBIT THE GASTRIN RESPONSE TO BOMBESIN [Abstract]. (Eng.) Taylor, I. L.; Walsh, J. H.; Carter, D. C.; Chew, P.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 25(4): 574A; 1977.

0872 BOMBESIN IS A POTENT STIMULANT OF PANCREATIC POLYPEPTIDE (PP) RELEASE [Abstract]. (Eng.) Taylor, I. L.; Walsh, J. H.; Wood, J.; Chew, P.; Carter, D. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 25(4):574A; 1977.

0873 INHIBITION OF GUINEA PIG FUNDIC GASTRIC MUCOSA ADENYLATE CYCLASE (AC) BY PROSTAGLANDIN PRECURSORS [Abstract]. (Eng.) Dozois, R. R.; Dousa, T. P. (Mayo Clinic and Foundation, Rochester, MN). *Clin. Res.* 25(4):607A; 1977.

0874 EFFECT OF PARENTERAL ASPIRIN ON THE HISTOLOGY AND POTENTIAL DIFFERENCE OF HUMAN GASTRIC MUCOSA [Abstract]. (Eng.) Paone, D. B.; Krause, W. J.; Ivey, K. J. (Harry S Truman Veterans Admin. Hosp., Columbia, MO). *Clin. Res.* 25(4):608A; 1977.

0875 EFFECT OF MANNITOL ON RAT GASTRIC MUCOSAL POTENTIAL DIFFERENCE [Abstract]. (Eng.) Enochs, M. R.; Ivey, K. J.; Burks, M.; Ackman, K. *Clin. Res.* 25(4):571A; 1977.

0876 COMPARATIVE EFFECTS OF FENOPROFEN, KETOPROFEN, IBUPROFEN AND NAPROXEN ON GASTRIC MUCOSA [Abstract]. (Eng.) Mann, N. S.; Mann, S. K.; Borkar, B. B. (Veterans Admin. Hosp., Louisville, KY). *Clin. Res.* 25(4):572A; 1977.

0877 COMPARATIVE EFFECTS OF ASPIRIN AND FENOPROFEN ON GASTRIC MUCOSA [Abstract]. (Eng.) Mann, N. S.; Mann, S. K.; Borkar, B. B. (Veterans Admin. Hosp., Louisville, KY). *Clin. Res.* 25(4):572A; 1977.

See also, 0783, 0821, 0835, 1019, 1051, 1054, 1057, 1058, 1060, 1062, 1067, 1068, 1079, 1207, 1209, 1343.

SECRETION AND METABOLISM

Pancreas

0878 PURIFICATION OF PLASMA MEMBRANES FROM RAT PANCREAS: A RAPID METHOD. (Eng.) Poirier, G. G.; Lambert, M. P.; Lebel, D.; Sakr, F.; Morisset, J.; Beaudoin, A. R. (Faculty of Sciences, Univ. Sherbrooke, Quebec J1K 2R1, Canada). *Proc. Soc. Exp. Biol. Med.* 155(3):324-329; 1977.

A rapid and simple method for the isolation of plasma membranes from the rat pancreas is described. Pancreases are homogenized in buffer A. The homogenate is filtered through cheesecloth and centrifuged at 50 x *g* for 5 min to remove RBC, unbroken cells, and connective tissue. The supernatant is then centrifuged at 5,100 x *g* for 20 min. The top layer of the 5,100 x *g* pellet is removed for further purification on a sucrose gradient. The separated layer is mixed with 75% sucrose to a final concentration of 40% and inserted in a stepwise sucrose gradient of 25, 30, 35, and 40% (containing the 5,100 x g pellet). This gradient is centrifuged for 1 hr at 115,000 x g. The different fractions are removed with a syringe and diluted with buffer B containing 40 mM Tris-HCl, pH 7.4, 0.25 M sucrose, 1 mg/ml albumin, and 5 mM β-mercaptoethanol. They are then centrifuged at 30,000 x g. Electron microscopy of the material recovered at the interface of sucrose 30-35% showed that it consisted mainly of smooth vesicular membranes, although some contamination by rough endoplasmic reticulum was observed. The specific activity of adenylate cyclase in the material sedimenting at the interface 30-35% and identified as smooth vesicular membranes by electron microscopy demonstrated a 44-fold increase in activity in comparison with that in the homogenate. The succinate dehydrogenase activity, a mitochondrial marker, was low in the adenylate-cyclase-rich fraction, and α-amylase was practically absent from the purified fraction. There was a sevenfold decrease in RNA content as compared to the total homogenate, which could be explained by the small contamination by rough endoplasmic reticulum. The optimal concentration of secretin necessary to obtain maximal stimulation of adenylate cyclase activity was 2 clinical U/ml. This method has several improvements over other techniques: the new finding that succinate dehydrogenase activity is decreased and the use of the RNA content as a marker for rough endoplasmic reticulum contamination. This method also provides an excellent tool for the study of the interaction of secretin and other hormones with the membrane.

0879 EXOCRINE PANCREAS RESPONSE TO A TEST MEAL IN THE DOG: CHANGES INDUCED BY 3 MONTHS' ETHANOL FEEDING.

(Eng.) Tiscornia, O. M.; Singer, M.; Mendes De Oliveira, J. P.; Demol, P.; Sarles, H. (Unite de Recherches de Pathologie Digestive, INSERM U31, 46 chemin de la Gaye, 13009 Marseilles, France). *Am. J. Dig. Dis.* 22(9):769-774; 1977.

Pancreatic secretion in response to a test meal was compared in nonalcoholic dogs and in those fed ethanol for 3 months. Three dogs were equipped with a chronic gastric fistula (Thomas cannula) and a new type of chronic pancreatic fistula that allows collection of pure nonactivated pancreatic juice after ingestion of a test meal. During the nonalcoholic period, a test meal (400 g canned dog meal) was given simultaneous with an infusion of 200 ml isotonic saline through the gastric cannula. Volume, bicarbonate concentration and output, and protein output showed a peak 40 min after ingestion of the test meal. Protein concentration showed an opposite pattern. During the alcoholic period, the animals were given 50% ethanol (2.0 g/kg/day) associated with a protein-supplemented diet through the gastric cannula, and test meal experiments were repeated at the end of this period. When compared with the nonalcoholic period, the secretory response to the meal was significantly modified; volume (-42%) and bicarbonate concentration (-19%) and output (-54%) were significantly lower, protein output remained unchanged, and protein concentration increased (+74%). All three dogs excreted protein plugs through the catheter collecting pancreatic juice from the main pancreatic duct. It is postulated that a depression of secretin release and an increased gastrin release and cholinergic tone could be the basis of the ethanol-evoked change in response to a test meal.

0880 CANINE PANCREATIC EXOCRINE SECRETORY RESPONSE TO LOW- AND HIGH-FAT ELEMENTAL DIETS.

(Eng.) Lewis, J. W.; Freeman, J. B. (Univ. Iowa Hosp. and Clinics, Iowa City, IA 52242). *Can. J. Surg.* 20(4):345-348; 1977.

The response of the dog exocrine pancreas to intragastric infusions of a commercially available diet with 30% of the calories present as fat (Flexical) was compared to that of a similar diet that was essentially fat-free (Vivonex). Each of these diets, as well as a standard tube feeding formula, was infused at the rate of 2 ml/min for 2 hr on each of 3 days. The volume and protein and bicarbonate content of eight 15-min samples of pancreatic secretion collected via a pancreatic pouch in the 2-hr period were measured. The high-fat elemental diet produced significantly ($p<0.05$) greater volume and bicarbonate output than did the low-fat elemental diet or the standard formula. Protein content of the pancreatic secretion was significantly ($p<0.01$) reduced during infusions of either low- or high-fat elemental diets compared to the standard diet, indicating decreased enzyme output. It is concluded that low-fat elemental diets are preferable for enteral nutrition in patients with pancreatic disorders where limitation of pancreatic secretions is desirable.

0881 CALCITONIN AND EXOCRINE PANCREATIC SECRETION IN MAN: INHIBITION OF ENZYMES STIMULATED BY CCK-PANCREOZYMIN, CAERULEIN, OR CALCIUM--NO RESPONSE TO VAGAL STIMULATION.

(Eng.) Hotz, J.; Goebell, H.; Ziegler, R. (Medical Clinic, Univ. Essen, Hufelandstr. 55, D4300 Essen 1, W. Germany). *Gut* 18(8):615-622; 1977.

The effect of calcitonin on human pancreatic secretion was studied under various conditions of stimulation. During a continuous i.v. infusion of both secretin plus cholecystokinin-pancreozymin (CCK-PZ, 1 U/kg/hr for each hormone) or secretin plus cerulein (1 U/kg/hr secretin, 75 μg/kg/hr cerulein), enzyme secretion was promptly reduced by an infusion of calcitonin (60 Medical Research Council U/hr) by more than 50%. In contrast, vagally stimulated enzyme secretion induced by insulin-hypoglycemia or carbamyl-choline was not altered against a background infusion of calcitonin in comparison with control experiments. Calcium-induced enzyme secretion was abolished by additional calcitonin infusion, which also prevented an increase in serum calcium. An additional high grade calcium infusion did not modify the inhibitory action of calcitonin on enzyme output stimulated by secretin and CCK-PZ. Fluid and bicarbonate secretion remained unaffected by calcitonin in all experimental conditions, whereas the outputs of calcium and magnesium paralleled generally the changes in enzymes. It is suggested that calcitonin interferes with hormone-mediated stimulation of the acinar cells without influencing cholinergic mechanisms. The inhibitory action of calcitonin on enzyme secretion does not appear to be mediated by a depletion of extracellular calcium in the pancreatic tissue by calcitonin.

0882 IN VITRO EFFECTS OF SECRETIN AND VASOACTIVE INTESTINAL POLYPEPTIDE ON HYDROLASE SECRETION AND CYCLIC AMP LEVELS IN THE PANCREAS OF FIVE ANIMAL SPECIES. A COMPARISON WITH CERULEIN. (Eng.) Robberecht, P.; Deschodt-Lanckman, M.; Lammens, M.; De Neef, P.; Christophe, J. (Faculte de Medecine, Universite libre de Bruxelles, bvd de Waterloo 115, B-1000 Brussels, Belgium). *Gastroenterol. Clin. Biol.* 1(6/7):519-525; 1977.

The *in vitro* effects of secretin, vasoactive intestinal polypeptide (VIP), and cerulein on hydrolase (amylase and lipase) secretion in pancreas fragments from the rat, mouse, guinea pig, cat, and dog were studied. Cyclic AMP levels were also measured to determine a correlation with hydrolase secretion. Cerulein stimulated pancreatic hydrolase secretion in all five species. Secretin and VIP were potent stimuli of enzyme secretion in the rat and guinea pig only. A greater amylase response to VIP than to secretin was observed in the rat, whereas the opposite was true in the guinea pig. The peptide concentration required for maximal stimulation was 100-fold higher for secretin or VIP than for cerulein. Cyclic AMP levels increased in pancreas fragments from all five species exposed to secretin or VIP, but cerulein had no effect on the intracellular levels of cyclic AMP. No quantitative correlation between cyclic AMP increase and amylase secretion in response to VIP and secretin was observed in the rat; in the guinea pig, VIP was a better stimulus than secretin of hydrolase secretion, and the reverse was true for the cyclic AMP response. These data confirm that in the rat and guinea pig pancreatic hydrolase secretion is stimulated *in vitro* by two different mechanisms, one involving cyclic AMP and the other involving cyclic guanosine 3',5' monophosphate and calcium.

0883 BIOCHEMICAL REACTIONS INVOLVED IN PANCREATIC ENZYME SECRETION. 2. INHIBITORY EFFECTS OF TETRACAINE AND ATROPINE. (Eng.) Morisset, J.; Beaudoin, A. R. (Dept. Biology, Univ. Sherbrooke, Sherbrooke, Quebec J1K 2R1, Canada). *Can J. Physiol. Pharmacol.* 55(3):639-643; 1977.

The inhibitory effects of tetracaine on cholecystokinin-pancreozymin (CCK-PZ)- and urecholine-stimulated pancreatic enzyme secretion and the potentiating effect of these drugs on dibutyryl cyclic AMP-stimulated enzyme secretion were investigated in male Sprague-Dawley rats; the effect of tetracaine on calcium efflux was also studied. Tetracaine pretreatment (2 mM, 30 min) did not modify basal amylase release, but the secretory response to urecholine (10^{-5} M) was subsequently reduced by 70%. The response to CCK-PZ (2 Ivy U) was not affected. When tetracaine was added to medium already containing both CCK-PZ and urecholine (10 min after the start of incubation), amylase release was not significantly affected. Co-addition of atropine (10^{-5} M) and urecholine to pancreatic tissue for 30 min resulted in complete inhibition of amylase secretion. The addition of atropine to tissue already stimulated by the cholinergic drug was associated with a 48% decrease in amylase secretion. The secretory response to CCK-PZ was not modified by atropine. Both CCK-PZ and tetracaine increased calcium efflux over the control level when added separately; when combined, a further increase in calcium release was observed. Urecholine caused a rapid release of calcium within the first 15 min, but addition of tetracaine to the cholinergic was not associated with a further increase in calcium efflux. When dibutyryl cyclic AMP was substituted for CCK-PZ and urecholine, there was a significant increase in calcium efflux that was less pronounced than that after CCK-PZ or urecholine. The effect of tetracaine on calcium efflux might partly explain the inhibitory action of the drug.

0884 EXOCRINE PANCREATIC INSUFFICIENCY SYNDROME IN CBA/J MICE. III. PATHOLOGICAL AND GENETIC ANALYSIS. (Eng.) Leiter, E. H.; Cunliffe-Beamer, T. (Jackson Lab., Bar Harbor, ME). *Gastroenterology* 73(2):260-266; 1977.

The clinical and histopathological characteristics of exocrine pancreatic insufficiency (EPI) syndrome were studied in CBA/J mice fed diets of protein and fat *ad libitum*. Exocrine pancreatic function was measured by a gelatin digestion test for fecal proteolytic activity. Two groups of 7- to 11-week-old female EPI mice were given protein/fat diets supplemented with either 0.5 or 1.0 g of pancreatin/30.0 g diet for 14 weeks; and weight changes during the next 17 weeks were compared with those in control mice. Plasma glucose and insulin levels were measured in EPI and normal mice and genetic analysis of the EPI syndrome was also performed. The sera of EPI mice were tested for antibody to Coxsackie viruses B1 and B6; the sera of normal CBA/J mice were tested for antibody to reovirus III; and sonicated pancreatic extracts were examined for type C group-specific viral antigen p30 by complement fixation testing. Gross and histopathological characteristics of EPI mice were emaciation, distention of the bowels, and replacement of exocrine pancreatic tissues by fat. Subclinical signs of the disease were focal areas of degeneration and inflammatory cell infiltration in the exocrine pancreas. EPI mice not treated with pancreatin had no fecal tryptic activity, but subclinical stages of the disease could not be detected by this test. Pancreatin produced significant, but reversible, increases in general health and body weight in EPI mice. EPI mice receiving long-term pancreatin treatment were normoglycemic (121 mg plasma glucose/100 ml), while untreated EPI mice were hypoglycemic (81 mg/100 ml). Both treated and untreated mice showed normal plasma insulin levels (40-60 μU/ml), indicating that EPI syndrome did not affect islet function. Matings of normal parents, normal parents with at least one previous EPI offspring, and EPI parents produced EPI progeny at frequencies of 1.4, 2.6, and 3.8%, resp., suggesting that the disease occurs spontaneously. Preweaning mortality in mice from EPI breeders was not due to early expression of a recessive gene as the incidence of mortality (37.8%) was markedly decreased to 3.2% by fostering 1-day-old neonates to asymptomatic CBA/J females. The trait could not be outcrossed to other strains, and no evidence of viral etiology was observed. The results indicate that the cause of exocrine cell necrosis characteristic of EPI is not genetic, but that there is a genetically predisposing background in EPI in the CBA/J strain.

0885 ACUTE PANCREATITIS FOLLOWING INTRAPANCREATIC COMPLEMENT ACTIVATION IN THE RAT. (Ger.) Seelig, R.; Seelig, H. P.; Rohnacher, R. (Institut fur Immunologie und Serologie, Universitat Heidelberg, D-6900 Heidelberg, W. Germany). *Z. Gastroenterol.* 14(6):654-667; 1976.

Adult Sprague-Dawley rats were sensitized with rabbit IgG (9 mg/week for 4 consecutive weeks, s.c.), and intrapancreatic Arthus phenomenon was induced in the animals with an antibody titer of 1/8 by the intraductal injection of rabbit IgG (4 mg) 7 days after the last sensitization. The intrapancreatic immune complex reaction caused acute pancreatitis (acinus cell necrosis, intravasal leukocytosis, leukodiapedesis, leukocyte infiltration of the walls of veins and capillaries, and, ultimately, interstitial leukocyte infiltration). Rabbit IgG administered to nonsensitized rats and bovine albumin administered intraductally to sensitized rats failed to induce acute pancreatitis. Complement reactivation with acute pancreatitis similar to that seen after the intraductal administration of rabbit IgG was induced in sensitized rats by the intraductal administration of inulin (15 and 30 mg) and cobra venom factor (45 or 200 U). The localization of the early acinus cell necrosis and of the maximal leukocyte infiltration was determined basically by the site of the primary complement activation. The extent of the necrosis was dependent on the diffusion of the complement-activating substance in the interstitial edema. Following the intraductal injection of inulin and cobra venum factor, the activation of the complement system was triggered via the C3 shunt, leading the release of cytolytically active complement and biologically active mediators from the complement system, independent of immune reactions. The findings indicate that intrahepatic complement activation by immunological and nonimmunological processes leads to acute necrotizing pancreatitis, with the release of cytolytically active complement being the common pathogenetic occurrence in the initial acinus cell membrane lesion.

0886 EFFECTS OF PANCREATIC DUCT LIGATURE IN RABBITS FED A TRADITIONAL DIET. (Fre.) Catala, J. (Institut de Physiologie, 2, rue Francois-Magendie, 31400 Toulouse, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4):573-578; 1977.

0887 LONG-TERM EFFECTS OF PANCREATIC DUCT LIGATURE ON DIGESTIBILITY IN THE PIG. (Fre.) Corring, T.; Bourdon, D. (Laboratoire de Physiologie de la Nutrition, I.N.R.A., 78350 Jouy-en-Josas, France). *Ann. Biol. Biochim. Biophys.* 17(4):579-582; 1977.

0888 SHORT- AND MEAN-TERM EFFECT OF PANCREATIC DUCT LIGATURE ON DIET DIGESTIBILITY IN THE FOOD-RESTRICTED GROWING RABBIT. (Fre.) Corring, T.; Lebas, F. (Laboratoire de Physiologie de la Nutrition, I.R.A., 78350 Jouy-en-Josas, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(3A):299-307; 1977.

0889 EFFECT OF ALCOHOLIC INTOXICATION ON THE FUNCTION AND OXIDATIVE PROCESSES OF PANCREATIC TISSUE. (Rus.) Shishkov, V. I. (Central Scientific Res. Lab., Sverdlovsk Medical Inst., Sverdlovsk, USSR). *Farmakol. Toksikol.* 40(5):613-616; 1977.

0890 ANALYSIS OF SUBSTANCE TRANSPORT INTO ACINAR CELLS. (Rus.) Ter-Akopova, I. R.; Bukhvalov, I. B. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Biull. Eksp. Biol. Med.* 34(8):242-244; 1977.

0891 DISTRIBUTION OF ^{99m}Tc-1-THIOGLUCOSE IN RATS: EFFECT OF ADMINISTRATION ROUTE ON PANCREATIC SPECIFICITY. (Eng.) Risch, V. R.; Honda, T.; Heindel, N. D.; Emrich, J. L.; Brady, L. W. (Hahnemann Medical Coll., Philadelphia, PA 19102). *Radiology* 124(3):837-838; 1977.

See also, 0787, 0807, 0834, 0853, 1024, 1032, 1046, 1047, 1048, 1049, 1055, 1056, 1094, 1256, 1347.

SECRETION AND METABOLISM

Hepatobiliary Tract

0892 ADRENERGIC MECHANISMS IN THE HEPATIC MICROCIRCULATION IN THE RAT. (Eng.) Koo, A.; Liang, I. Y. S.; Cheng, K. K. (Dept. Physiology, Univ. Hong Kong, Sassoon Rd., Hong Kong). *Q. J.*

Exp. Physiol. 62(3):199-208; 1977.

To elucidate the role of adrenergic constrictor-dilator mechanisms in the hepatic sinusoids in the control of blood flow in the terminal hepatic microcirculation, the *in vivo* rat liver microvascular bed was examined microscopically, and the diameter of the hepatic sinusoids was measured by serial photomicrography. The intraportal infusion of epinephrine, norepinephrine, and tyramine produced a constriction of the sinusoids at all concentrations (10^{-9}-10^{-4} M), but dilatation of some sinusoids occurred when the concentrations were low (10^{-9}-10^{-7} M). The effects of tyramine on the sinusoids were attributed to the release of endogenous norepinephrine, which activated either alpha- or beta-adrenergic receptors, causing either constriction or dilatation, resp. Alpha-adrenergic blockade with phenoxybenzamine (1 mg/kg) caused a significant increase in the mean diameter of the sinusoids (6.3 ± 0.05 versus 6.5 ± 0.05 µm, $p<0.001$) after 30 min. Beta-adrenergic blockade by propranolol (1 mg/kg) induced a significant constriction of the sinusoids. All the above responses were abolished by pretreatment with reserpine. The automatic control of sinusoidal blood flow may be regulated by norepinephrine-mediated basal vasomotor tone in the hepatic sinusoids.

0893 HEPATIC SUPPORT WITH HEPATOCYTE SUSPENSIONS IN A PERMEABLE MEMBRANE DIALYZER.

(Eng.) Olumide, F.; Eliashiv, A.; Kralios, N.; Norton, L.; Eiseman, B. (Denver General Hosp., Denver, CO 80220). *Surgery* 82(5):599-606; 1977.

A new concept of hepatic support with circulating hepatocytes on one side of a cuprophan membrane and blood from an anhepatic pig on the other was evaluated in 19 dialysis experiments. Levels of pyruvate metabolism (50% of an initial value of 480 counts/min in $^{14}CO_2$ produced from 2-^{14}C-pyruvate/10^6 cells after 2-4 hr of perfusion) and oxygen utilization (0.01 ml O_2/g liver/min after 4 hr of perfusion) were similar to those obtained in previous experiments, when liver cells in a centrifuge are perfused with oxygenated plasma. Of six anhepatic pigs given late hepatic support, five showed neurologic improvement. One had concomitant improvement in electroencephalographic results. A membrane hemodialysis unit in which hepatocytes circulate against blood from an anhepatic animal is the most suitable extracorporeal liver support unit described so far. Its simplicity allows repeated and prolonged use.

0894 CHANGES IN THE BLOOD-BRAIN BARRIER IN HEPATIC COMA AFTER HEPATECTOMY IN THE RAT.

(Eng.) Livingstone, A. S.; Potvin, M.; Goresky, C. A.; Finlayson, M. H.; Hinchey, E. J. (Montreal General Hosp., 1650 Cedar Ave., Montreal, Quebec H3G 1A4, Canada). *Gastroenterology* 73(4): 697-704; 1977.

The possibility that the hepatic coma seen after massive liver necrosis or hepatectomy may result from an alteration in the blood-brain barrier was examined. Bloodless two-stage hepatectomies were performed on Wistar rats, and the animals were maintained with i.v. glucose infusions. When the animals were in late stage 3 or stage 4 hepatic coma, the functional integrity of the blood-brain barrier was assessed by means of the sudden arterial injection-15-sec decapitation-Oldendorf tissue residue technique, and by the i.v. injection of trypan blue. The former showed that the barrier had become permeable to D-sucrose, inulin, and L-glucose, substances that usually do not cross the barrier; the latter showed that the barrier had also become permeable to trypan blue, so that the brains of the comatose animals stained blue whereas normal brains did not. The brains of comatose animals uniformly showed cerebral edema on gross examination (their water contents were increased), and, on electron microscopic examination, their astrocytes were swollen, especially in pericapillary locations. The break in the barrier appears to be associated with the formation of cerebral edema, and implies both that substances that usually do not gain access to the brain parenchyma can now do so and that substances usually conserved, such as neurotransmitters, can now escape.

0895 CAN HEPATIC COMA BE CAUSED BY A REDUCTION OF BRAIN NORADRENALINE OR DOPAMINE?

(Eng.) Zieve, L.; Olsen, R. L. (Veterans Admin. Hosp., Minneapolis, MN 55417). *Gut* 18(9):688-691; 1977.

The hypothesis that reduction in brain dopamine or norepinephrine causes hepatic coma was tested in male Sprague-Dawley rats. Intraventricular infusions of octopamine (3.2 mg over 290 min), which raised brain octopamine concentrations more than 20,000-fold, resulted in reduction in brain norepinephrine and dopamine by as much as 90% without affecting the alertness of activity of normal rats. As this reduction of brain catecholamines is much greater than any reported in hepatic coma, the values observed in experimental hepatic failure probably have no etiological significance for the encephalopathy that ensues.

0896 THE EFFECT OF GLUCAGON AND BLOOD TRANSFUSION ON HEPATIC CIRCULATION AND OXYGEN CONSUMPTION IN HEMORRHAGIC SHOCK.

(Eng.) Lindberg, B.; Darle, N. (Sahlgrenska sjukhuset, S-413 45 Goteborg, Sweden). *J. Surg. Res.* 23(4):257-263; 1977.

Experiments were carried out to determine whether the injection of glucagon combined with blood transfusions could increase liver blood flow and oxygen consumption in the treatment of hemorrhagic shock. Ten pigs were subjected to a standard shock model, including two 30-min periods of hemorrhagic shock at 50 mm Hg. After the first period of shock, glucagon (50 µg/kg) was administered i.v., and the shed blood was transfused. Portal vein and hepatic artery flow as well as oxygen consumption were measured. Both periods of shock resulted in a marked decrease in blood flow as well as oxygen consumption. Treatment with glucagon and blood transfusion resulted in an increase in hepatic artery flow to 300% of the preshock value, but no significant increase in the portal vein flow occurred compared with blood transfusion alone. The high hepatic artery flow caused a very high inflow of oxygen to the liver. In spite of this high inflow of oxygen, the liver oxygen consumption was not significantly higher than after blood transfusion alone. Glucagon administration to pigs in hemorrhagic shock does not increase portal vein flow, as it does in dogs.

0897 THE EFFECT OF DEXTRAN 40 AND BLOOD TRANSFUSION ON HEPATIC CIRCULATION AND OXYGEN CONSUMPTION IN HEMORRHAGIC SHOCK.

(Eng.) Lindberg, B.; Darle, N. (Sahlgrenska sjukhuset, S-413 45 Goteborg, Sweden). *J. Surg. Res.* 23(4):264-273; 1977.

The effect of treatment with dextran 40 and blood transfusion on hepatic circulation and oxygen consumption was studied in pigs subjected to a standard model of hemorrhagic shock. The animals were bled to 50 mm Hg arterial pressure and kept at this pressure for 30 min, one group being treated with the shed blood and the other group with an equal volume of dextran 40. Thirty minutes after completion of the treatment, the animals were once again bled to 50 mm Hg and kept at this level for 30 min. During the first period of shock the flow in both vessels decreased to 53% of the baseline value, and the oxygen consumption fell to 41% of the initial values. After treatment with the shed blood, the flow in the hepatic artery and portal vein returned to preshock values, and the oxygen consumption was 39% higher than the initial values. After dextran 40 treatment, the flow in the hepatic artery was 91% higher than the initial value and the flow in the portal vein was 127% higher. In spite of these high flow values, the oxygen consumption was significantly lower in the dextran 40 group. In the second period of shock, flow values were reduced to approximately the same values as in the first period, but the oxygen consumption was significantly lower in the dextran 40 group than in the blood transfusion group. The hepatic circulation during shock is different in the pig compared with that in the dog and cat.

0898 THE ENHANCEMENT OF ADENYL CYCLASE BY STEROID THERAPY IN SHOCK.

(Eng.) Jones, C. A.; McArdle, A. H.; Hinchey, E. J. (Montreal General Hosp., Montreal, Quebec H3G 1A4, Canada). *Surgery* 82(4):483-488; 1977.

Experiments were carried out in dogs to study the normal response of the second messenger system in splanchnic tissues to hormonal stimulation and to determine whether the hormonal response is altered by hemorrhagic shock. Hepatic and intestinal adenyl cyclase (AC) activity were measured after a single pulse injection of epinephrine (0.25 mg, i.v.) or glucagon (0.3 mg, i.v.) into normal dogs and into dogs subjected to hemorrhagic shock. Hemorrhagic shock abolished the increase in AC activity seen in normal animals following epinephrine and significantly reduced that induced by glucagon. These changes were reflected in the glucose production from the liver induced by these hormones. The response of AC to the *in vitro* addition of epinephrine or glucagon, as well as the nonspecific stimulator of AC, sodium fluoride, showed that it is the receptor site of the enzyme that is primarily affected by shock. The treatment of dogs with 30 mg/kg of methylprednisolone following the reinfusion of shed blood significantly improved the response of AC to epinephrine in both liver and intestine, and this improvement was reflected in the glucose production by the liver in response to the hormone. The hormonal sensitivity of the splanchnic second messenger system, which is reduced significantly in shock, appears to be markedly improved by the administration of pharmacological doses of steroids.

0899 CHANGES IN CARDIAC OUTPUT DISTRIBUTION AFTER LIVER DEARTERIALIZATION IN THE RAT.

(Eng.) Lindell, B.; Aronsen, K. F. (Malmo General Hosp., Malmo, Sweden). *Acta Chir. Scand.* 143(4):207-213; 1977.

The changes in cardiac output distribution were studied in male Wistar rats after hepatic artery ligation and additional ligament division. These procedures resulted initially in a marked decrease in the arterial blood supply to the liver, and this effect was still pronounced 4 weeks after the operation. The decrease in liver blood supply induced by the procedure was in part counterbalanced by arteriovenous shunting in the preportal region. A temporary redistribution of cardiac output with reduced fractions to colon and spleen was found 2 weeks after these operations; this finding may have been a result of diversion of arterial blood through arteriovenous shunts.

0900 MORPHOLOGICAL ALTERATIONS AND FUNCTIONAL CHANGES OF INTERHEPATOCELLULAR JUNCTIONS INDUCED BY BILE DUCT LIGATION.

(Eng.) Metz, J.; Aoki, A.; Merlo, M.; Forssmann, W. G. (Anatomisches Institut der Universitat, Im Neuenheimer Feld 307, D-6900 Heidelberg, W. Germany). *Cell Tissue Res.* 182(3):299-310; 1977.

The effect of bile duct ligation on the intercellular junctions of hepatocytes was investigated in male Wistar rats. The features and the arrangement of the bile canaliculi and the zonulae occludentes were altered 48 hr after ligation, which caused an increase in intracanalicular pressure. The lumina of the bile canaliculi enlarged, and the microvilli disappeared. The array of the zonulae occludentes became irregularly shaped, the number of strands diminished, and interruptions of the strands occurred. One minute after the i.v. injection of horseradish peroxidase (10 mg/100 g), a leakage in the bile-blood barrier was detected. The gap junctions between the hepatocytes disappearec after bile duct ligation. The results show that the zonulae occludentes are mobile structures that are changed by increased unilateral pressure. Due to their ultrastructural alterations, a leakage of the permeability barrier between physiological compartments occurs.

0901 CONTROL OF LIVER SIZE IN HEAT-ACCLIMATED HAMSTERS.

(Eng.) Chayoth, R.; Krauthammer, N.; Winikoff, J.; Sod-Moriah, U. A. (Dept. Biology, Ben Gurion Univ. of the Negev, Beer Sheva, Israel). *J. Appl. Physiol.* 43(3):445-448; 1977.

To determine whether the decreased liver size seen in hamsters exposed to high ambient temperatures is controlled by cyclic AMP, or by other factors, the activity of DNA synthesis was correlated with cyclic AMP levels in the livers of hamsters maintained in a hot environment (35 ± 1 C) and of controls, maintained at 22 ± 1 C. In the heat-exposed animals, liver weight decreased more than did body weight. Therefore, liver weight constitutes a lower percentage of body weight during exposure to high ambient temperature. This change was not a result of dehydration, since water content of the whole body and of the liver was not altered during heat acclimation. However, changes in lactic dehydrogenase isozyme proportions indicated a higher rate of liver degradation during the first 2 weeks of heat exposure. These changes were accompanied by enhancement of DNA synthesis, which was elevated during the early period of heat exposure and later fell to the control levels. The enhanced DNA synthesis might be a result of a high rate of tissue regeneration, which probably takes place in the organ following the commencement of the degradative processes. Since the activity of DNA synthesis was negatively correlated with cyclic AMP levels, it is suggested that cyclic AMP plays some role in controlling hepatic DNA synthesis during heat acclimation.

0902 INFUSION TOMOGRAPHY OF THE GALLBLADDER: MECHANISM OF GALLBLADDER WALL OPACIFICATION IN EXPERIMENTAL ACUTE CHOLECYSTITIS.

(Eng.) Moncada, R.; Cardoso, M.; Danley, R.; Rodriguez, J.; Kimura, K.; Pickleman, J.; Brandly, J. (Loyola Univ. Medical Center, Maywood, IL 60153). *Am. J. Roentgenol.* 129(4):587-590; 1977.

A canine model of acute cholecystitis was used to determine the mechanism of opacification of the gallbladder wall by infusion tomography. The dogs underwent cystic duct ligation or cystic duct and cystic artery ligation. About 48 hr later, ^{125}I-labeled meglumine and sodium diatrilzoate were infused i.v. to a dose of 2.2 ml/kg. In normal gallbladders, the majority of the radioactivity was demonstrated within the blood vessels. There was no radioactivity in the extravascular spaces. A large proportion of the active contrast material had been taken up within polymorphonuclear granulocytes. In inflamed gallbladders, there was also some radioactive contrast material in the vascular spaces. In the extravascular space, contrast material was present exclusively within polymorphonuclear granulocytes. Some of these WBC may have come out of the vessels due to vessel disruption, as hemorrhage was seen in a few acutely inflamed gallbladders. However, even when the vessels maintained their integrity, WBC containing contrast material were seen in the edematous walls, especially in the subserosa. The results indicate that in the normal gallbladder, labeled radiopaque contrast material remains within the blood vessels, where some is taken up by polymorphonuclear leukocytes. In the inflammed gallbladder, inflammatory cells containing labeled contrast material are found in the edematous tissues of the gallbladder wall. This, together with hyperemia and probably tissue-fluid equilibration of contrast material, seem to be responsible for the visualization of the gallbladder wall with infusion tomography.

0903 INCREASED BILIARY TREE PERMEABILITY PRODUCED IN RATS BY HEPATOACTIVE AGENTS.

(Eng.) Peterson, R. E.; Fujimoto, J. M. (Univ. Wisconsin, Center for Health Sciences, Madison, WI 53706). *J. Pharmacol. Exp. Ther.* 202(3):732-739; 1977.

Changes in recovery of [^{3}H]sucrose or [^{3}H]mannitol administered by retrograde intrabiliary injection were compared between control groups and groups of Sprague-Dawley female rats treated with various drugs. After retrograde intrabiliary injection with 23.4 µl of the test substance, the bile duct cannula was occluded for 0.5 and 6 min (first experiment) or 0.5 and 3 min (other experiments) before bile flow was restarted, and individual drops were collected. In comparing the dose-response effects of dehydrocholate, cholate (C), and taurocholate (TC), it was shown that C and TC reduced [^{3}H]mannitol recovery beyond levels that could be attributed to the choleretic effect of these compounds. Similarly, in rats in which bile flow was reduced by hypothermia (31 C), C and TC reduced [^{3}H]mannitol recoveries, whereas dehydrocholate had no effect on the recovery. The authors conclude that C and TC increased biliary tree permeability as seen by the increase in [^{3}H]mannitol absorbed from the biliary tree. Female rats treated with ethynylestradiol (EE, 0.4 and 4 mg/kg/day) for 4 days had a reduced rate of bile flow. Comparable reductions in bile flow were achieved by the i.v. infusion of indocyanine green or by hypothermia. Since at these reduced bile flows only EE treatment reduced recovery of the markers, the authors conclude that EE increased biliary tree permeability. Also, EE-treated animals were less sensitive to the choleretic response but were more sensitive to the permeability-enhancing effect of various doses of TC than were control animals.

0904 HEPATIC EXCRETION OF CHOLECYSTOPAQUES INTRODUCED INTO THE CANINE JEJUNUM.

(Eng.) Menuck, L.; Amberg, J. R.; Bates, M. (Dept. Radiology, Univ. California, San Diego, CA). *Invest. Radiol.* 12(1):106-108; 1977.

The biliary excretion of five oral cholecystopaques (calcium ipodate, sodium ipodate, sodium trypanoate, iocetamic acid, and iopanoic acid) was measured following their introduction into the jejunum of bile fistula dogs. The mean maximal iodine concentration in the bile ranged from 2.2 ± 0.55 mg/ml following a dose of 33 mg of iodine/kg of iopanoic acid to 12.9 ± 1.4 mg/ml after the same dose of sodium ipodate. Cumulative excretion at the end of 3 hr was over five times greater with sodium ipodate in comparison to ipoanoic acid. The ability of the more water-soluble media to pass through the unstirred water layer of the intestine may explain these data.

0905 TECHNETIUM-99m-LABELED N-(2,6-DIMETHYLPHENYLCARBAMOYLMETHYL) IMINODIACETIC ACID (Tc-99m HIDA): A NEW RADIOPHARMACEUTICAL FOR HEPATOBILIARY IMAGING STUDIES. (Eng.) Ryan, J.; Cooper, M.; Loberg, M.; Harvey, E.; Sikorski, S. (Univ. Maryland Hosp., 22 S. Greene St., Baltimore, MD 21201). *J. Nucl. Med.* 18(10):997-1004; 1977.

An easily formulated, stable kit preparation of technetium-99m-labeled *N*-(2,6-dimethylphenylcarbamoylmethyl) iminodiacetic acid (^{99m}Tc HIDA), suitable for use in humans, was developed and tested in mice and dogs. The tracer was cleared rapidly from the blood and excreted predominantly by the liver in both species. In dogs, the hepatobiliary clearance of ^{99m}Tc HIDA was significantly greater than that of ^{14}C HIDA and ^{113}Sn HIDA. The LD_{50} for HIDA in mice, 168 mg/kg, exceeded the average human dose by a factor of 1,000 on a per-weight basis. Blood clearance curves for ^{99m}Tc HIDA in 12 normal subjects were biexponential with half-times of 4.6 ± 1.0 min and 31.5 ± 7.0 min, and cumulative 90-min urine samples contained 14.2 ± 1.8% of the injected dose. Images in normal subjects and nonjaundiced patients showed rapid concentration of tracer by the liver, and activity was present within the biliary system in 10-20 min. In jaundiced patients, the tracer blood clearance was delayed and urinary excretion increased, but intestinal activity, indicating biliary patency, was imaged in those patients without complete focal obstruction of the common duct. ^{99m}Tc HIDA is a nontoxic radiopharmaceutical useful for clinical evaluation of hepatobiliary disorders in humans.

0906 INTERACTION OF BROMOSULFOPHTHALEIN WITH MITOCHONDRIAL MEMBRANES--INHIBITION OF RESPIRATION. (Eng.) Burr, R.; Schwenk, M.; Pfaff, E. (Inst. Toxicology, Univ. Tubingen, D-7400 Tubingen, W. Germany). *Biochem. Pharmacol.* 26(6):461-466; 1977.

The kinetics of mitochondrial respiratory inhibition produced by BSP were studied. BSP reversibly inhibited mitochondrial respiration. The most sensitive was state 3 respiration (Ki about 3 nmol/mg protein independent of substrate). At higher concentrations (20-100 nmol/mg protein), state 4 respiration and uncoupled respiration were also inhibited. This inhibition was substrate dependent. With succinate, inhibition appeared to be noncompetitive at low concentrations and competitive above 1 mM succinate (half-maximal inhibition at 9-17 nmol/mg protein, dependent on succinate concentration). Substrate permeation did not seem to be the only sensitive step in oxidation, as was deduced from similar results obtained on glycerol phosphate respiration. Using artificial electron shunts and difference spectroscopy, individual dehydrogenases were found to be probable sites of BSP action. It is suggested that BSP acts via the electrostatic effects of the increased negative surface charge, making dehydrogenases less accessible for their substrates.

0907 INHIBITION BY BROMSULPHTHALEIN OF THE BILIARY EXCRETION OF ITS GLUTATHIONE CONJUGATE. (Eng.) Gregus, Z.; Fischer, E.; Varga, F. (Univ. Medical Sch., Szigeti u. 12, H-7643 Pecs, Hungary). *Biochem. Pharmacol.* 26(20):1951-1952; 1977.

The importance of the competition between BSP and its glutathione conjugate (BSP-GSH) during the biliary excretion of the two substances was investigated in rats. The concentration of BSP in the liver was much higher than that of BSP-GSH. In bile duct-ligated rats, BSP-GSH proved to be a very weak inhibitor of the hepatic uptake of BSP. Similarly, BSP depressed the hepatic concentration of BSP-GSH significantly ($p<0.01$) only at a dose of 120 μmol/kg (as compared with a dose of 60 μmol/kg, i.v.). However, 60 μmol/kg of BSP did not affect the hepatic uptake of BSP-GSH, although the same dose of BSP markedly depressed the biliary excretion of BSP-GSH. These results suggest that competition between BSP and BSP-GSH for hepatic uptake may not be significant in the overall transport of BSP or BSP-GSH from blood to bile. BSP-GSH (60-120 μmol/kg) did not significantly depress the biliary excretion of BSP, but the excretion rate of BSP-GSH was markedly depressed by a dose as low as 15 μmol/kg of BSP. A significant inhibition of BSP-GSH excretion was observed in the first 15 min of bile collection with a simultaneous administration of 7.5 μmol/kg of BSP. The excretion of BSP-GSH in the following 30 min of bile collection masked this inhibition. The results indicate that the inhibitory effect of free BSP on BSP-GSH excretion may have an important role in the transport rate of total dye excretion.

0908 PHARMACOKINETIC ASPECTS OF SULFOBROMOPHTHALEIN TRANSPORT IN CHRONICALLY CARBON TETRACHLORIDE-INTOXICATED RATS. (Eng.) Iga, T.; Sugiyama, Y.; Yokota, M.; Tomono, Y.; Awazu, S.; Hanano, M. (Faculty Pharmaceutical Sciences, Univ. Tokyo, Bunkyo-ku, Tokyo 113, Japan). *Biochem. Pharmacol.* 26(20):1867-1875; 1977.

To elucidate the factors affecting the hepatic transport of BSP in pathological conditions, the kinetics (i.e., binding activities of plasma and hepatic cytoplasmic proteins, and glutathione S-transferase activity of the Y-fraction) of the BSP disappearance from the blood and appearance in the bile were studied in rats chronically intoxicated with carbon tetrachloride (0.1 ml/100 g, s.c., twice weekly, 8-9 weeks). Although plasma protein albumin concentration decreased during chronic intoxication, no quantitative difference was shown in the high affinity binding site (K_1). A significant decrease was shown in the cytoplasmic protein concentration for the Y- and Z- fractions in intoxicated rats; no significant difference was observed in the number of binding sites for both fractions, but their binding constants decreased. Glutathione S-transferase activity and glutathione (GSH) content were not altered, although a decrease in conjugating activity per rat was expected. The time course for the plasma disappearance and biliary excretion of BSP showed a remarkable delay after CCl_4 intoxication, while no difference was shown in the bile flow rate. It is concluded that hepatic blood flow might play a primary role in the initial plasma disappearance of BSP and that the decrease in the Y-fraction binding activity might explain the decrease in BSP uptake rate into the liver that was observed in intoxicated rats.

0909 TRANSFER AND REOXIDATION OF REDUCING EQUIVALENTS AS THE RATE-LIMITING STEPS IN THE OXIDATION OF ETHANOL BY LIVER CELLS ISOLATED FROM FED AND FASTED RATS.

(Eng.) Cederbaum, A. I.; Dicker, E.; Rubin, E. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Arch. Biochem. Biophys.* 183(2):638-646; 1977.

Factors regulating the oxidation of ethanol were studied in liver cells isolated from fed and fasted Sprague-Dawley rats. The rate of ethanol oxidation was greater in liver cells from fed rats than from fasted rats. Inhibitors of the malate-aspartate shuttle decreased the rate of ethanol oxidation, suggesting that this shuttle contributes to the reoxidation of cytosolic NADH produced during the oxidation of ethanol. The greater inhibition of ethanol oxidation by antimycin than by rotenone suggested that the α-glycerophosphate shuttle also plays an important role in transporting reducing equivalents. The components of the malate-aspartate and α-glycerophosphate shuttles stimulated ethanol oxidation to a greater extent in liver cells from fasted rats than those from fed rats, suggesting that in the fasted state ethanol oxidation is regulated by the intracellular concentrations of substrate shuttle components, which transfer reducing equivalents into the mitochondria. Therefore, uncoupling agents, which stimulate oxygen consumption, do not stimulate ethanol oxidation, and concentrations of antimycin that depress oxygen uptake are much less effective in decreasing ethanol oxidation. By contrast, in liver cells from fed rats, the rate of ethanol oxidation was increased by uncoupling agents. Such stimulation was not observed when cells were prepared in the absence of albumin, probably due to leakage of shuttle substrates that leads to abnormally low intracellular levels. When the shuttle substrates were added back to these preparations, uncouplers were effective in stimulating the rate of ethanol oxidation beyond the stimulation produced by the shuttle substrates alone. Thus, under conditions of sufficient intracellular levels of the intermediates of the substrate shuttles, ethanol oxidation is regulated by the capacity of the mitochondrial respiratory chain to reoxidize reducing equivalents generated by the alcohol dehydrogenase reaction.

0910 THE EFFECTS OF ACUTE ETHANOL FEEDING AND OF CHRONIC BENFLUOREX ADMINISTRATION ON THE ACTIVITIES OF SOME ENZYMES OF GLYCEROLIPID SYNTHESIS IN RAT LIVER AND ADIPOSE TISSUE.

(Eng.) Pritchard, P. H.; Bowley, M.; Burditt, S. L.; Cooling, J.; Glenny, H. P.; Lawson, N.; *et al.* (Univ. Hosp. and Medical Sch., Clifton Blvd., Nottingham NG7 2UH, England). *Biochem. J.* 166(3):639-642; 1977.

The effects of ethanol and of 1-(3-trifluoromethylphenyl)-2-[*N*-(2-benzoyloxyethyl)amino]propane or S-780 (benfluorex) on the activities of some of the enzymes of glycerolipid synthesis were investigated in the livers and adipose tissue of male Wistar rats. The rats were treated for 5 days with benfluorex (50 mg/kg) or with suspending medium (controls). They were then intubated with an acute intoxicating dose of ethanol (5 g/kg) or with glucose of equivalent energy content. Ethanol treatment of the control rats that had not received benfluorex specifically increased the hepatic activity of the soluble phosphatidate phosphohydrolase by about fivefold in 6 hr. The equivalent increase in the benfluorex-treated rats was about twofold. The activities of the other enzymes tested (liver glycerol phosphate acyltransferase; microsomal phosphatidate phosphohydrolase, phosphatidate cytidylyltransferase, choline phosphotransferase, and diacylglycerol acyltransferase; and adipose glycerol phosphate acyltransferase, total phosphatidate phosphohydrolase, ATP-+Coenzyme A-dependent synthesis of acylalkylglycerol, and ATP-+Coenzyme A-dependent synthesis of acylalkylglycerol from hexadecylglycerol) were not significantly altered. The results are compatible with the hypothesis that changes in the activity of the soluble phosphatidate phosphohydrolase contribute to the control of the metabolism of fatty acids and to their incorporation into hepatic triacylglycerols.

0911 EFFECTS OF CLOFIBRATE ON ETHANOL-INDUCED MODIFICATIONS IN LIVER AND ADIPOSE TISSUE METABOLISM: ROLE OF HEPATIC REDOX STATE AND HORMONAL MECHANISMS.

(Eng.) Savolainen, M. J.; Jauhonen, V. P.; Hassinen, I. E. (Dept. Medical Biochemistry, Univ. Oulu, Kajaanintie 52 A, SF-90220 Oulu 22, Finland). *Biochem. Pharmacol.* 26(5):425-431; 1977.

Mechanisms by which clofibrate decreases the development of acute alcoholic fatty liver were studied in rats, especially in regard to hepatic redox state and hormonal regulation of carbohydrate and lipid metabolism. A partial inhibition of the ethanol-induced increase in cytosolic NADH/NAD ratio was observed. As a result, in clofibrate-treated rats (600 mg/kg/day, 9 days, s.c.) hepatic sn-glycerol-3-phosphate (α-GP) concentration during ethanol oxidation also remained at the same level as in normal control rats. Clofibrate treatment prevented the ethanol-induced increase in the adipose tissue cyclic AMP and plasma free fatty acid concentrations. Hepatic concentrations of coenzyme A (Co-A)-SH, acetyl-CoA, and long-chain acyl-CoA were markedly increased by clofibrate treatment. Plasma insulin concentration was decreased in clofibrate-treated rats, which also showed an impaired glucose tolerance. The results show that clofibrate is able to restrict the availability of substrates (α-GP and fatty acids) for hepatic triglyceride synthesis *in vivo*. In addition, it is concluded that the partial inhibition of ethanol-induced fatty liver by clofibrate may result from the enhancement of the oxidation pathway of fatty acid metabolism, as suggested by the enormous increase in hepatic content of CoA-SH and its derivatives.

0912 THE MECHANISM OF ENHANCEMENT OF RAT LIVER TRYPTOPHAN PYRROLASE ACTIVITY BY ACUTE ETHANOL ADMINISTRATION.
(Eng.) Badawy, A. A. B.; Evans, M. (Univ. Hosp. Wales, Cardiff CF4 7XB, Wales). *Biochem. Soc. Trans.* 5(4):1035-1036; 1977.

The mechanism by which rat liver tryptophan pyrrolase activity is enhanced by acute ethanol administration was investigated by determining the half-life of the enzyme after acute ethanol administration (5 ml/kg, i.p. as a 25% volume/volume solution) in intact male Wistar rats. Ethanol significantly ($p<0.001$) enhanced the holoenzyme and total pyrrolase activities by 2.35- and 1.78-fold, resp., and increased the ratio of holoenzyme/apoenzyme activity from a control value of 0.74 to 1.45. The half-life of the total enzyme in ethanol-treated rats was 3.94 hr, which represented a 73% increase in the stability of the pyrrolase by ethanol. This finding provides further support for the involvement of tryptophan in the ethanol effect.

0913 THE MECHANISM OF INHIBITION OF RAT LIVER TRYPTOPHAN PYRROLASE ACTIVITY BY CHRONIC ETHANOL ADMINISTRATION.
(Eng.) Evans, M.; Badawy, A. A. B. (Univ. Hosp. Wales, Cardiff CF4 7XB, Wales). *Biochem. Soc. Trans.* 5(4):1037-1038; 1977.

The mechanism by which the chronic administration of ethanol inhibits rat liver tryptophan pyrrolase activity was investigated by determining the effect of chronic ethanol, sucrose, or water treatment on cortisol-induced pyrrolase activity. Male Wistar rats received one of the following three drinking fluids for 28-31 days: water, sucrose (9%, weight/volume), or ethanol (5% volume/volume for 2 days, 7.5% for 2 further days, and 10% thereafter). Some rats also received cortisol acetate (20 mg/kg, i.p.) 4 hr before sacrifice. Chronic ethanol or sucrose administration inhibited the total pyrrolase activity by 35% but had no effect on that of the holoenzyme; the apoenzyme was therefore the form specifically inhibited by either treatment (by 80%, $p<0.001$). Cortisol was equally effective in inducing the enzyme activity in both chronic ethanol-treated and control rats, suggesting that ethanol does not inhibit the synthesis of the apoenzyme. The cortisol effect in rats treated chronically with sucrose was, however, lower by 24-34% than that in controls. The results suggest that sucrose is not a suitable control treatment in studies of the effects of ethanol on liver or brain tryptophan metabolism.

0914 IN VIVO STUDIES OF AMINO ACID METABOLISM IN RAT INTESTINE AND LIVER.
(Fre.) Demigne, C.; Aufrere, J.; Remesy, C. (Station de Physiopathologie de la Nutrition, I.N.R.A., Theix, Saint Genes Champanelle, 63110 Beaumont, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4):615-620; 1977.

Liver uptake and intestinal metabolism of amino acids in rats during absorption of a diet high in casein (13%) was studied. The diet fed to Sherman rats, conditioned to absorb their food in 8 hr, consisted of 79% wheat starch, 2% corn oil, 5% minerals, and 1% vitamins in addition to the casein. Animals were anesthetized with Nembutal (40 mg/kg, s.c.) 4 hr after they began eating, and blood was removed for amino acid analysis from the portal vein and artery or from the hepatic and portal veins. Livers were then removed, minced, and centrifuged. Alanine in the portal vein came from casein hydrolysis, from transamination of glutamic and aspartic acids in the intestinal cells, and from deaminated glutamine. Amino acid release into the portal vein was compared with overall liver balance, taking into account the flow rate of the hepatic artery. The uptake of alanine, glycine, and aromatic amino acids by the liver was high (78%, 82%, and 64-70% of the total alanine, glycine, and aromatic acids in the administered casein, resp.), while that of serine and threonine was low (49% and 43%, resp.). Only a small fraction of branched-chain amino acids was taken up by the liver (about 20%); the main uptake of these occurred in the periperhal tissues.

0915 THE ISOLATION AND FURTHER CHARACTERIZATION OF THE BILIRUBIN TETRAPYRROLES IN BILE-CONTAINING HUMAN DUODENAL JUICE AND DOG GALL-BLADDER BILE.
(Eng.) Gordon, E. R.; Chan, T. H.; Samodai, K.; Goresky, C. A. (Montreal General Hosp., 1650 Cedar Ave., Montreal, Quebec H3G 1A4, Canada). *Biochem. J.* 167(1):1-8; 1977.

A simple reproducible method for the isolation of the native bilirubin tetrapyrroles from bile-containing human duodenal juice and dog gallbladder bile is described, and the tetrapyrroles are further characterized. Bilirubin and its conjugates are extracted from bile or bile-containing duodenal juice into chloroform containing 10 mM tetraheptylammonium chloride. The intact bilirubin tetrapyrroles are then separated by thin-layer chromatography. Structural elucidation was made after coupling of the individual pigments with diazonium salts. Four azopigments were detected: azopigment α_0 or dipyrrolic azobilirubin, azopigment δ or dipyrrolic azobilirubin monoglucuronide, azopigment α_3 or dipyrrolic azobilirubin monoglucoside, and, from dog gallbladder bile, azopigment α_2. The last conjugate required further verification of its structure. After methanolysis, it was shown by combined gas-liquid chromatography-mass spectrometry to contain xylose in a 1:1 molar ratio with the azopigments of bilirubin. Human bile contained 86% bilirubin monoglucuronide, 7% bilirubin monoglucuronide monoglucoside diester, 4% bilirubin monoglucuronide, and 3% bilirubin. Dog gallbladder bile had a considerably different composition; it contained 47% bilirubin diglucuronide, 40% bilirubin monoglucuronide monoglucoside diester, 8% bilirubin monoglucuronide, 4% bilirubin diglucoside, 1-2% bilirubin, and traces of conjugates containing xylose. The total bilirubin content and proportions of the conjugates did not change in bile that was frozen and stored at -20 C under N_2, whereas in the chloroform/tetraheptylammonium chloride extract, similarly stored, total pigment was slowly lost and the diglucuronide conjugate converted into the monoglucuronide.

0916 SYNTHESIS AND ENTEROHEPATIC CIRCULATION OF BILE SALTS. (Eng.) Hanson, R. F.; Pries, J. M. (Univ. Minnesota Hosp., Minneapolis, MN). *Gastroenterology* 73(3):611-618; 1977.

A review is presented of the present knowledge of bile salt synthesis, secretion, absorption by the intestine, and removal by the liver. The pathways for bile salt synthesis, bile acid conjugation, and sulfation, and the role of carrier proteins in bile acid synthesis are discussed. Interaction of bile salts with hepatic enzymes such as 3-hydroxy-3-methylglutaryl-CoA reductase, 7-hydroxylase, and 12-hydroxylase is reviewed. It is suggested that the uptake of bile salts is mediated by a Na$^+$-dependent carrier transport mechanism.

0917 SEX-LINKED DIFFERENCES IN BILE ACID METABOLISM OF GERMFREE RATS. (Eng.) Eyssen, H.; Smets, L.; Parmentier, G.; Janssen, G. (Rega Inst. Medical Res., Univ. Leuven, Minderbroedersstraat 10, B-3000 Leuven, Belgium). *Life Sci.* 21(5):707-712; 1977.

To investigate the influence of sex on bile acid composition, sulfated and unsulfated bile acids were quantitated in male and female germfree rats. Gas chromatography and mass spectrometry revealed that β-muricholic acid and cholic acid were the major bile acids in both sexes; in addition, 3β-hydroxy-5-cholenoic acid, chenodeoxycholic acid, α-muricholic acid, allochenodeoxycholic acid, and allocholic acid were present. β-Muricholic and cholic acids accounted for 61.4% and 22.7%, resp., of total bile acids in the small intestine of males; females had 38.9% of β-muricholic acid and 50% of cholic acid. In females, the bile acid sulfate fraction increased from 1.1% in the small intestine to 22.3% in the large intestine; in males these values were 0.2% and 1.7%, resp. A considerable increase in the relative amounts of allochenodeoxycholic and allocholic acids was observed in the cecum and large intestine of the female rat, where more than 70% of these substances was in the bile acid sulfate fraction. In males, these allo-bile acids were mainly in the unsulfated fraction, and their relative amounts did not increase in the large intestine. This study shows important sex-linked differences in the relative amounts and sulfation of bile acids in germfree rats.

0918 BILE ACID BINDING BY 100 000 g SUPERNATANTS FROM RAT LIVER. (Eng.) Strange, R. C.; Nimmo, I. A.; Percy-Robb, I. W. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press (Baltimore, MD): 125-132; 1977.

The binding of cholic acid, glycocholic acid, chenodeoxycholic acid, and lithocholic acid to rat liver 100,000 x *g* supernatants was demonstrated using equilibrium dialysis. Rectangular hyperbolae fitted the binding data for chenodeoxycholic acid, lithocholic acid, and glycocholic acid, suggesting that binding could be explained in terms of single saturable components. The binding data for cholic acid were better fitted by a straight line plus a rectangular hyperbola, suggesting the presence of at least two different types of binding sites. The binding characteristics of the bile acids suggest that the binding components are involved in bile acid transport. When mixtures of [^{14}C]lithocholic acid and liver supernatants were eluted from columns of Sephadex G-75, a prominent peak of [^{14}C]lithocholic acid appeared with proteins of molecular weight approximately 40,000. A second, smaller peak of [^{14}C]lithocholic acid was eluted with proteins of molecular weight approximately 10,000.

0919 HYDROXYLATIONS IN BIOSYNTHESIS AND METABOLISM OF BILE ACIDS CATALYZED BY RECONSTITUTED SYSTEMS FROM RAT LIVER MICROSOMES. (Eng.) Cottman, J.; Danielsson, H.; Hansson, R.; Wikvall, K. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press (Baltimore, MD): 1-10; 1977.

Several hydroxylations in the biosynthesis and metabolism of bile acids were studied in reconstituted systems from rat liver microsomes consisting of cytochrome P-450 and NADPH-cytochrome P-450 reductase at different stages of purification. A partial separation of 5β-cholestane-3α,7α-diol 12α- and 26-hydroxylase activities was obtained by polyethylene glycol fractionation of cholate-solubilized cytochrome P-450 followed by diethylaminoethyl (DEAE)-cellulose chromatography. These two hydroxylase activities differed not only from each other but also from other hydroxylase activities such as taurodeoxycholate 7α-hydroxylase activity and laurate 11- and 12-hydroxylase activities. Cholesterol and cholestanol 7α-hydroxylase activity was compared with 5β-cholestane-3α,7α-diol 12α- and 26 hydroxylase activities. By polyethylene glycol and ammonium sulfate fractionation, a partial separation of these three activities was obtained. The possibility that some specificity also resided in the NADPH-cytochrome P-450 reductase was tested with reductase preparations of different purity. In contrast to several other hydroxylations including 12α-hydroxylation of 5β-cholestane-3α,7α-diol, 26-hydroxylation of 5β-cholestane-3α,7α,12α-triol and 7α-hydroxylation of taurodeoxycholic acid, which were all stimulated by the different preparations, 25-hydroxylation of 5β-cholestane-3α,7α,12α-triol and 7α-hydroxylation of cholesterol were stimulated to a greater extent by the less pure preparations than by the purer preparations. The results indicate the participation of several cytochromes P-450 in the hydroxylations occurring in bile acid biosynthesis and metabolism and point to the possibility that other factors present in less pure preparations of NADPH-cytochrome P-450 reductase also may play a role in imparting specificity to the hydroxylations.

0920 EXPERIMENTAL CHOLESTASIS BY DIBUCAINE AND HARMALINE: EFFECTS ON BILE FLOW AND HEPATIC TRANSPORT OF BILE ACIDS, ETHACRYNIC ACID AND OUABAIN. (Ger.) Peterlik, M. (Institut fur allgemeine und experimentelle Pathologie, Universitat Wien, Wahringer Strasse 13, A-1090 Vienna, Austria). *Wien. Klin. Wochenschr.* 89(14):494-501; 1977.

Dibucaine- and harmaline-induced experimental cholestasis and the effects of these substances on bile secretion and active transport of bile acids, ethacrynic acid and ouabain were studied in the isolated liver of adult Sprague-Dawley rats. Both dibucaine (0.5-1.6 mM) and harmaline (1.7-4 mM) inhibited bile secretion; a nearly linear dose-dependence effect was found for both substances. The effect of dibucaine was fully reversible, but bile secretion failed to reach the normal level after inhibition with harmaline at the highest concentration (4 mM), which may indicate partially irreversible damage of the secretory function of the liver. Both substances caused only a slight reduction in the oxygen consumption of the isolated liver. While typical signs of intrahepatic cholestasis (dilatation of the canaliculi) were seen, the ultrastructure of the liver was completely intact, and no signs of nonspecific liver damage (swelling of mitochondria or of the endoplasmic reticulum) were seen, which indicates that the cholestasis was not due to a nonspecific hepatotoxic effect. The transport of taurocholic acid into the isolated liver was influenced only slightly by dibucaine (1.6 mM) and harmaline (4 mM), but dibucaine inhibited the influx of cholic acid, ethacrynic acid, and ouabain by 60%, 58%, and 90%, resp., and harmaline caused inhibitions by 60%, 82%, and 86%, resp. The findings indicate that harmaline and dibucaine inhibit taurocholate transfer only to the extent of the Na^+-dependent fraction, and that drug-membrane interactions, primarily on the sinusoidal surface, but possibly also at the canalicular pole of the hepatocytes, are responsible for the impairment of basal and stimulated bile secretion. The perfusion model is suitable for the experimental study of intrahepatic cholestasis, of the influence of the hepatocyte membrane functions on canalicular bile secretion, and of the possible pathogenetic role of these functions in intrahepatic cholestasis.

0921 GLUCOCORTICOID INFLUENCE ON MORPHOLOGICAL DIFFERENTIATION AND BILE ACID METABOLISM IN RAT LIVER CELL CULTURE. (Eng.) Lambiotte, M. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press (Baltimore, MD): 33-47; 1977.

The influence of dexamethasone (dex) on morphological differentiation and bile acid metabolism was studied in primary cell cultures of rat fetal liver, in monolayers of adult rat hepatocytes, and in a cloned strain of a cultivated "minimal deviation" rat hepatoma. Labeled cholic or deoxycholic acid (51 and 52 mCi/mmol, resp.) were added to the cultures, and the various metabolites appearing in the medium were tentatively determined using thin-layer chromatography (TLC), scanning, and autoradiography. In fetal liver cultures, dex (1.9×10^{-6} M) induced the appearance of bile canaliculi after 3 or 4 days, towards which the hepatocytes seemed to retain some polarity. Cholate and deoxycholate were conjugated mainly to taurine, with traces of glycine conjugates in the treated group; the conjugation was retained longer in the presence of dex. Deoxycholate was partially transformed into taurocholate, free cholate, and traces of glycocholate, but the hydroxylation was hardly noticeable in controls. The adult hepatocyte monolayers remained healthy longer in the presence of dex, whereas cells in the control cultures degenerated in 4-6 days. In the two experimental groups, deoxycholate was transformed into taurocholate, taurodeoxycholate, glycocholate, glycodeoxycholate, and free cholate. The proportion of glycine conjugates was higher than in the fetal liver culture, especially in the control group, and the hydroxylation products were more abundant in the presence of dex. In the hepatoma monolayers, cholate conjugation was obtained after only 2 days in dex, and deoxycholate conjugation was markedly increased by the hormone. Deoxycholate hydroxylation was noticed only in the treated plates; the main induced product had a relative front in TLC migration intermediate between glycocholate and glycodeoxycholate. The results provide good evidence for a glucocorticoid induction, not only of bile excretory pathways, but also of the 7α-hydroxylation system of deoxycholic acid, which could be important *in vivo* during the functional maturation of rat fetal liver.

0922 THE HEPATOTOXICITY OF LITHOCHOLIC ACID IN MALE MICE. (Eng.) Taylor, W.; Lesna, M. (Medical Sch., Univ. Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, England). *Br. J. Pharmacol.* 61(1):133P-134P; 1977.

The mechanism by which lithocholic acid (LA) causes intrahepatic cholestasis and early damage to the bile canaliculi in rodents was studied in Balb/c mice by determining the cholesterol and bile acids in the gallbladder bile and by observing the development of hepatic lesions after the administration of LA (8 mg/day by gavage). Cholesterol was determined colorimetrically, and bile acids by gas chromatography-mass spectrophotometry, in animals killed 0.5, 1.5, 2.5, and 3.5 days after the start of treatment. The biliary cholesterol concentrations rapidly increased while total bile acids first increased and then decreased, causing a dramatic decrease in the total bile acid/cholesterol ratio. Between 1.5 and 2.5 days there was a large decrease in cholic acid concentration in the bile; both LA and 3α,6β-dihydroxy-5β-cholanoic acid, which were not detectable in control bile, appeared in increasing amounts. These changes preceded the appearance of liver damage, which was well established after 2.5 days. The livers of LA-treated animals showed necrotic areas of irregular distribution with some dilatation of centrilobular venules and inflammatory and neutrophil infiltration. LA may exert its hepatotoxic effect in mice by altering hepatic cholesterol and bile acid biosynthesis.

0923 BILE ACID CONTROL OF BILIARY CHOLESTEROL SECRETION IN MAN.

(Eng.) Schersten, T.; Lindblad, L. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press (Baltimore, MD): 175-181; 1977.

The interrelationships between biliary cholesterol secretion and the secretion of bile acids and lecithin were studied during depletion of the bile acid pool and during duodenal administration of cholic or chenodeoxycholic acid (1.0 g/hr, 4 hr) in 13 patients 7-12 days after cholecystectomy for uncomplicated gallstone disease. The relation between bile acid and cholesterol secretion rates was curvilinear during bile acid pool depletion ($r=0.70$) and during cholic acid secretion ($r=0.86$). The lecithin secretion rate was significantly correlated to the secretion rate of cholesterol under all the experimental conditions. These correlations were stronger at low bile acid secretion rates giving bile supersaturation in cholesterol. The results suggest that the biliary secretion rate of lecithin plays a determining role for the mass of secreted cholesterol and that the importance of lecithin is different at different rates of bile acid secretion.

0924 NUTRITIONAL AND HORMONAL CONTROL OF LUNG AND LIVER FATTY ACID SYNTHESIS.

(Eng.) Kumar, S. (New Jersey Medical Sch., Newark, NJ 07103). *Arch. Biochem. Biophys.* 183(2):625-637; 1977.

The effect of a high-fructose diet on the levels of fatty acid synthesizing enzymes was investigated in male Sprague-Dawley rats, and extensive studies on the nutritional and hormonal control of fatty acid synthesis in the mammalian lung were carried out. During starvation and in streptozotocin-induced diabetes, the total activities of rat lung acetyl coenzyme A (CoA) carboxylase and fatty acid synthetase were reduced to one-third of the normal values. Refeeding the starved animals or the administration of insulin to diabetic animals restored the levels to the original values. The insulin effect was dose- and time-dependent. These data contrast with those in the liver, where a 30- to 50-fold depression of these enzymes was observed in the diabetic state, and the administration of insulin was actually followed by doubling of the activity over normal controls. A fat-free high-fructose diet (containing 60% fructose by weight) enhanced the activities of liver enzymes three- to sixfold over the values of controls on laboratory diet but had no effect on the lung enzymes. Long-term feeding of the fructose diet also increased the activities of liver enzymes from diabetic animals to twice the value of normal controls on laboratory diet. Insulin administration to fructose-fed diabetic animals restored the enzyme activities to those obtained with fructose-fed normal controls. However, the stimulation of lung enzymes of diabetic animals was effected either by fructose or by insulin. Antigen-antibody titrations and measurements of the rate of protein synthesis showed that the increased activity of the lung and liver fatty acid synthetase is due to enhanced content rather than increased specific activity. These data suggest that the effects of insulin or fructose on fatty acid synthesizing enzymes are mediated through intermediate(s) whose concentration is affected in the experimental diabetes. Furthermore, all tissues may not have stringent insulin requirements, since the lung enzymes can be stimulated by fructose alone.

0925 INCREASED LIVER CALCIUM AFTER CALCIUM OR MILK GAVAGE IN RATS.

(Eng.) Meyer, R. A., Jr.; Meyer, M. H. (Sch. Dentistry, Marquette Univ., 604 North 16th St., Milwaukee, WI 53233). *Experientia* 33(4):546-547; 1977.

Experiments were carried out in male SPD rats to determine whether there is a change in liver calcium content during times of known calcitonin secretion. The liver calcium level was raised significantly at 0.5 hr ($p<0.01$) and at 1 hr ($p<0.05$) after gavage with milk (2 ml/100 g) and at 1 and 2 hr ($p<0.05$ and 0.01, resp.) after gavage with 300 mM $CaCl_2$ (2 ml/100 g), in comparison with that in controls that received either sham gavage or a deionized water gavage. Plasma calcium and phosphate were not significantly altered by the milk gavage, but were significantly affected by $CaCl_2$ gavage. The lack of change in plasma calcium, liver weight, and extracellular fluid content indicated that the increased liver calcium seen after the milk meal must represent increased intracellular calcium. Since the increase in liver calcium for the whole liver (0.27 μmol/100 g body weight) was quite small relative to the calcium content of the milk gavage (60 μmol/100 g body weight), it seems that the liver is not an important storage site for plasma calcium and that physiological stimuli of calcitonin secretion do not result in as large an increase in liver calcium as reported following the injection of the hormone.

0926 LIVER ENZYME INDUCTION BY THE ANION EXCHANGER RESIN, DOWEX 1 x 2, IN THE RAT. (Eng.) Beyhl, F. E.; Granzer, E. (Hoechst AG., Postfach 800320, D-6230 Frankfurt am Main 80, W. Germany). *Experientia* 33(9):1194-1195; 1977.

The nature of bile acid sequestration by the anion exchange resin, Dowex 1 x 2, was investigated by determining whether it induces the biosynthesis of microsomal drug metabolizing liver enzymes in male Wistar rats. The rats received the resin (500 mg/kg/day) by stomach tube for 8 days. This treatment led to liver enlargement and significant increases in liver acid phosphatase, glucose-6-phosphate dehydrogenase, malic enzyme, catalase, neotetrazolium reductase, NADPH:cytochrome c oxidoreductase, and aminopyrin demethylase ($p<0.001$, $p<0.001$, $p<0.0005$, $p<0.0005$, $p<0.0005$, $p<0.005$, and $p<0.0005$, resp.). The mitochondrial enzymes, glutamate and succinate dehydrogenases; mitochondrial cytochrome c reductase; and most of the soluble enzymes, α-glycerophosphate, malate, isocitrate, and 6-phosphogluconate dehydrogenases and the transaminase, were unchanged. Therefore, Dowex 1 x 2 treatment does not influence mitochondrial and cytosolic metabolisms, or at most, only parts of them. The sequestration of bile acids by anion exchange resin treatment with Dowex 1 x 2 mimics the biochemical effects of clofibrate- and phenobarbital-like drugs in the liver.

0927 THE EFFECT OF LEVAMISOLE ON PHOSPHODIESTERASE ACTIVITY. (Eng.) Constantopoulos, A.; Kafasi, V.; Doulas, N.; Liakakos, D.; Matsaniotis, N. (Aghia Sophia Children's Hosp., Athens, Greece). *Experientia* 33(3):395-396; 1977.

To determine whether levamisole acts by modifying nucleotide levels through activation of phosphodiesterase, the activity of this enzyme was estimated in mouse liver homogenates in the presence and absence of levamisole (10^{-2}-10^{-7} M). Phosphodiesterase activity was 1,394 and 1,399 nmol/mg protein/30 min in the presence and absence of the anthelmintic drug, resp. These data demonstrate that levamisole does not modify nucleotide levels via the activation of phosphodiesterase.

0928 DRY WEIGHT, TRIGLYCERIDES CONTENT AND GLUCOSE-6-PHOSPHATASE ACTIVITY OF HEPATOCYTES SEPARATED BY SEDIMENTATION. (Eng.) Tongiani, R.; Bibbiani, C.; Malvaldi, G. (Istituto di Patologia Generale, Universita degli Studi di Pisa, Scuola Medica, Via Roma 55, I-56100 Pisa, Italy). *Acta Histochem. (Jena)* 59(2):232-238; 1977.

Isolated rat hepatocytes were subfractionated by isopycnic or velocity sedimentation, and dry mass, triglycerides content, and glucose-6-phosphatase activity of different subpopulations were determined. The distribution of the cell dry masses and dry mass per average cell were similar in all the fractions separated by isopycnic sedimentation. Velocity sedimentation allowed a satisfactory separation of cells of different dry mass. Triglyceride content and glucose-6-phosphatase activity of cells of the different fractions obtained by isopycnic sedimentation showed no statistically significant differences. Subpopulations fractionated by velocity sedimentation differed in both triglyceride content and glucose-6-phosphatase activity, which were substantially parallel to the cell dry mass. Isopycnic sedimentation is not suitable for subfractionation of hepatocytes on the basis of their dry weight; this result can be achieved by velocity sedimentation.

0929 A COMPARISON OF EFFECT OF INSULIN ON HEPATIC METABOLITES, GLUCONEOGENESIS, AND KETOGENESIS. (Eng.) McDaniel, H. G. (Veterans Admin. Hosp., Birmingham, AL 35206). *Am. J. Physiol.* 233(1):E13-E18; 1977.

The effect of insulin on hepatic metabolites was studied in tryptophan-treated rats, and this effect was correlated with insulin-induced suppression of fatty acid oxidation and conversion of labeled lactate to glucose. In 12-hr fasted rats given tryptophan (25 mg/100 g, i.p.), insulin (10 U/kg, i.m.) decreased the hepatic content of alanine and the three precursors of oxalacetate (malate, citrate, and aspartate) while elevating hepatic pyruvate. These changes are consistent with suppression of the pyruvate carboxylase step. Animals fasted for 24 hr lose the effect on oxalacetate precursors, and this correlated with a loss of suppression of hepatic ketones. The decrease in hepatic alanine and oxalacetate precursors was more sensitive than the blood sugar. However, the conversion of labeled lactate to glucose was not inhibited by insulin in 12-hr fasted animals. (+)-Decanoylcarnitine also produced a decrease in oxalacetate precursors comparable to insulin and a lowering of the blood sugar. However, in fasted animals not given tryptophan it did not alter the blood sugar. Therefore, in tryptophan-treated animals alterations of fatty acid oxidation by insulin or (+)-decanoylcarnitine produce a fall in oxalacetate precursors consistent with inhibition of pyruvate carboxylase; however, this does not equate with overall suppression of gluconeogenesis by either of these agents in the absence of tryptophan.

0930 RESTORATION OF GLYCOGENESIS IN HEPATOCYTES FROM STARVED RATS. (Eng.) Geelen, M. J. H.; Pruden, E. L.; Gibson, D. M. (Lab. Veterinary Biochemistry, State Univ. Utrecht, Utrecht, Netherlands). *Life Sci.* 20(6):1027-1034; 1977.

Hepatocytes from rats starved for 48 hr were studied to define conditions that permit glycogen synthesis following the provision of metabolic precursors *in vitro*. Hepatocytes from the starved rats synthesized glycogen only when incubated in the presence of both glucose and glucogenic precursors (combinations of alanine, glycerol, pyruvate, lactate, or fructose). Unlabeled glucose increased the net flux of [U-^{14}C]alanine or [U-^{14}C]lactate into glycogen over 30-fold. Unlabeled lactate and alanine facilitated the incorporation of [U-^{14}C]-

glucose into glycogen, even though the basal level with glucose alone was relatively high, as compared to basal glucose incorporation. In systems containing no added endocrines, glucose dampened glycogen phosphorylase activity in a cyclic AMP-independent fashion. Fructose was unable to mimic the effects of glucose on glycogen deposition and on glycogen phosphorylase activity. The results suggest that with these liver cell preparations, it is possible to accumulate glycogen and to explore the early changes that ensue in the transition from the "glucogenic" state of liver metabolism in starvation to the "lipogenic" state in refeeding.

0931 THE EFFECTS OF EXPERIMENTAL INFLAMMATION ON ADAPTIVE SYNTHESIS OF RAT LIVER FATTY ACID SYNTHETASE. (Eng.) Shutler, G. G.; Langstaff, J. M.; Jamieson, J. C.; Burton, D. N. (Dept. Microbiology, Univ. Manitoba, Winnipeg, Manitoba R3T 2N2, Canada). *Arch. Biochem. Biophys.* 183(2):710-717; 1977.

The effects of experimental inflammation, induced by the s.c. injection of oil of turpentine (0.5 ml/100 g) on adaptive synthesis of liver fatty acid synthetase were investigated in male rats. Liver levels of α_1-acid glycoprotein, an "acute-phase" protein known to be synthesized at an accelerated rate as a result of inflammation, were also measured. The increase in fatty acid synthetase activity in livers of rats that were starved and then fed a fat-free diet was suppressed to an extent dependent on the periods between fat-free feeding and inflammation and inflammation and sacrifice. Inflammation induced 2 hr after refeeding gave complete suppression, whereas inflammation after 10 hr of fat-free feeding had no suppressive effect. When induced 2.5 or 7.5 hr after refeeding, inflammation led to partial suppression of the increase in fatty acid synthetase activity. The increase in liver α_1-acid glycoprotein levels characteristic of inflammation was reduced in animals inflamed 7.5 or 10 hr after fat-free feeding, but was unaffected when inflammation was induced 2.5 hr after refeeding. The ratio of free to membrane-bound polyribosomes in the liver increased from 0.77 in rats that were neither starved nor fed a fat-free diet to 3.31 in rats that were starved and then fed a fat-free diet for 15 hr. When inflammation was induced 2.5 hr after refeeding, the ratio increased to only 1.74 after 15 hr of refeeding. Inflammation resulted in a marked reduction in the level of glycogen in the liver, regardless of the time of induction of inflammation and the dietary status of the animal. The findings may be explained by changes in the activities of enzymes of glycogen metabolism, which lead to enhanced glycogenolysis in response to inflammation.

0932 EFFECTS OF OLEATE, PALMITATE, AND OCTANOATE ON GLUCONEOGENESIS IN ISOLATED RABBIT LIVER CELLS. (Eng.) Zaleski, J.; Bryla, J. (Inst. Biochemistry, Univ. Warsaw, 02-089 Warsaw, Poland). *Arch. Biochem. Biophys.* 183(2):553-562; 1977.

The effect of oleate, palmitate, and octanoate on glucose formation was studied in rabbit hepatocytes with lactate or pyruvate as substrate. Octanoate was much more quickly oxidized and utilized for ketone body production than were oleate and palmitate. Among the fatty acids studied, only octanoate resulted in a marked increase of the 3-hydroxybutyrate/acetoacetate ratio. Each of the fatty acids stimulated glucose synthesis from pyruvate. The enhancement of gluconeogenesis by long-chain fatty acids was abolished after the addition of ammonia. Examination of the "crossover" plot revealed that the stimulatory effect of fatty acids was due to (a) a stimulation of pyruvate carboxylation, (b) a provision of reducing equivalents for glyceraldehyde phosphate dehydrogenase, and (c) an acceleration of flux through hexose diphosphatase. Moreover, palmitate and oleate resulted in an increased generation of mitochondrial phosphoenolpyruvate, while in the presence of octanoate, the activity of mitochondrial phosphoenolpyruvate carboxykinase was diminished. When lactate was used as the glucose precursor, palmitate and oleate increased glucose production by about 50% but did not affect the contribution of mitochondrial phosphoenolpyruvate carboxykinase to gluconeogenesis. In spite of the stimulation of both pyruvate carboxylase and hexose diphosphatase, as judged from the crossover plot, the addition of octanoate resulted in a marked inhibition of both glucose formation and mitochondrial generation of phosphoenolpyruvate. The inhibitory effect of octanoate was reversed by ammonia. The results indicate that fatty acids and ammonia are potent regulatory factors of both the rate of glucose formation and the contribution of mitochondrial phosphenolpyruvate carboxykinase to gluconeogenesis in hepatocytes of the fasted rabbit.

0933 ACTION OF COBALT CHLORIDE ON THE BIOSYNTHESIS, DEGRADATION, AND UTILIZATION OF HEME IN FETAL RAT LIVER. (Eng.) Woods, J. S.; Carver, G. T. (Natl. Inst. Environmental Health Sciences, P.O. Box 12233, Research Triangle Park, NC 27709). *Drug Metab. Dispos.* 5(5):487-492; 1977.

The effects of cobalt chloride on heme biosynthesis and degradation and on the utilization of heme in the synthesis of various hemoproteins in fetal rat liver were investigated. $CoCl_2$ (50 mg/kg) administered to 18-day pregnant rats resulted in inhibition of the heme-biosynthetic pathway enzymes, δ-aminolevulinic acid (ALA) synthetase, and ferrochelatase, and increased the activity of microsomal heme oxygenase in fetal liver. Concomitantly, a 75-95% reduction in the rate of ^{3}H-ALA incorporation into fetal mitochondrial hemes was observed, and a 50% depletion of total microsomal heme levels occurred. Treatment of pregnant rats with $CoCl_2$ on the 18th day of gestation also resulted in a 35-40% reduction in the activities of cytochrome oxidase and aminopyrine demethylase measured in neonatal liver at 1 week after birth; deficiencies in both mitochondrial and microsomal hemoprotein function persisted for several weeks postnatally. Thus, $CoCl_2$ substantially alters hepatic heme metabolism in fetal liver. Utilization of agents such as $CoCl_2$ as pharmacological tools may permit a clearer understanding of the gestational role of heme in the perinatal development of hepatic hemoprotein function.

0934 LIPOGENESIS IN HEPATOCYTES OF GENETICALLY OBESE RATS. (Eng.) Bloxham, D. P.; Fitzsimons, J. T. R.; York, D. A. (Dept. Physiology and Biochemistry, Univ. Southampton, Southampton S09 3TU, England). *Horm. Metab. Res.* 9(4):304-309; 1977.

Lipogenesis from (U-^{14}C)lactate, (U-^{14}C)glucose, and tritiated water (^3H_2O) was investigated in hepatocytes obtained from both genetically obese rats and their lean littermates by the technique of nonrecirculating perfusion by gravity. Analysis of the incorporation of ^{14}C (microatoms of C/100 mg protein) from (U-^{14}C)lactate into various lipid fractions revealed a clear difference in the lipogenic capacity of hepatocytes from obese and lean rats on a standard chow diet. For hepatocytes from obese rats, the major product was triglyceride fatty acids (1.95 ± 0.11 versus 0.18 ± 0.01 microatoms of C/100 mg protein for lean hepatocytes, $p<0.001$), whereas for hepatocytes from lean rats the main product was glyceride-glycerol (3.48 ± 0.23 versus 0.61 ± 0.07 microatoms C/100 mg protein for obese hepatocytes, $p<0.001$) when these values were measured after 60 min of incubation with lactate. Sterol synthesis at this time was significantly higher ($p<0.001$) in hepatocytes from obese rats compared with lean rats (0.33 ± 0.04 versus 0.05 ± 0.01 microatoms of C/100 mg protein, resp.). There was virtually no difference in glucose incorporation into fatty acids in hepatocytes from either lean or obese rats, demonstrating that enhancement in hepatic fatty acid synthesis in the obese syndrome is related to increased activity of enzymes involved in lactate utilization rather than in enhanced conversion of glucose to lactate. Fatty acid synthesis increased in both lean and obese rats on a fat-free diet and fell markedly in both lean and obese rats when they were starved. Fatty acid synthesis in hepatocytes from obese rats was more resistant to starvation than in lean animals since fatty acid synthesis declined only to a rate of 0.23 microatoms C/100 mg protein/30 min in obese rats, whereas fatty acid synthesis was negligible in starved lean rats. When obese rats were changed from a chow diet to a fat free diet, lactate incorporation changed from being about equally divided between fatty acids and glyceride-glycerol to a 66% incorporation for fatty acids and a 19.3% incorporation for glyceride-glycerol. Following starvation in lean and obese rats, glyceride-glycerol represented the major point of lactate incorporation (54% for obese and 91% for lean). Studies involving the simultaneous incubation of hepatocytes with ^3H_2O and (U-^{14}C)-labeled substrates indicated that lactate is a major source of carbon for fatty acid synthesis at low concentrations and possibly the only source at high concentrations.

0935 PLASMA LIPOPROTEIN CHANGES IN EXPERIMENTAL CHOLESTASIS IN THE DOG. (Eng.) Danielsson, B.; Ekman, R.; Johansson, B. G.; Petersson, B. G. (Univ. Hosp., Lund, Sweden). *Clin. Chim. Acta* 80(1):157-170; 1977.

Using zonal ultracentrifugation, gel electrophoresis, and Sephadex gel chromatography, plasma lipoproteins were studied after 1 week of complete biliary obstruction in the dog. The common bile duct was ligated and transected in eight dogs, and two dogs were sham-operated. A considerable increase in low density lipoprotein (LDL) was found 1 week after operation, with a zonal ultracentrifugal pattern that was more complex than that found before operation. The lipid composition was characterized by an increase of phospholipids and a decrease of triglycerides in cholestatic LDL fractions. None of the fractions displayed the inverse cholesterol-cholesterol ester ratio characteristic for human LP-X. The apoprotein composition of cholestatic LDL was also markedly changed. Apoprotein A I, already present in the normal LDL_2 subclass, increased, and two apoproteins with apparent molecular weights of 35,000-40,000 appeared in considerable amounts. The amount of high density lipoprotein (HDL) was decreased during cholestasis without any appreciable changes in composition. The results support the hypothesis that lipoprotein changes in cholestasis are related to an abnormal transformation of HDL particles.

0936 STUDIES ON RAT LIVER PLASMA MEMBRANE: ALTERED PROTEIN AND PHOSPHOLIPID METABOLISM AFTER INJECTION OF D-GALACTOSAMINE. (Eng.) Bachmann, W.; Harms, E.; Hassels, B.; Henninger, H.; Reutter, W. (III Medizinische Abteilung des Krankenhauses Schwabing und Forschergruppe Diabetes, D-8000 Munchen, Kolner Platz 1, W. Germany). *Biochem. J.* 166(3):455-462; 1977.

The metabolism of protein and phospholipid in isolated rat liver plasma membranes was investigated 3 and 6 hr after the injection of D-galactosamine (375 mg/kg, i.p.) *in vivo*. During this time, all the biochemical and morphological alterations associated with hepatitis developed. After the injection of D-galactosamine the concentration of sphingomyelin in the plasma membrane decreased to below 60% of the control values. The activity of 5'-nucleotidase (EC3.1.3.5), which has been purified as a sphingomyelin-protein complex, decreased in the total homogenate as well as in the plasma-membrane fraction of livers of rats treated with galactosamine, to about 60% of the control values. Protein synthesis, as measured by the incorporation of [^{14}C]leucine into plasma membranes, was decreased to 45% of that of the controls. However, only small differences were observed in the amino acid composition of the plasma membrane after D-galactosamine treatment. The protein composition of the plasma membranes was determined by sodium dodecyl sulfate/polyacrylamide-gel electrophoresis. The results showed a change from low- to high-molecular weight proteins after the injection of galactosamine. These results demonstrate different metabolic processes of the plasma membrane altered during the induction of galactosamine hepatitis.

0937 THE ACTIVITY OF SILYBIN ON PHOSPHOLIPID METABOLISM OF NORMAL AND FATTY LIVER IN VIVO. (Eng.) Castigli, E.; Montanini, I.; Roberti, R.; Porcellati, G. (Inst. Biochemistry, Univ. Perugia, 06100 Perugia, Italy). *Pharmacol. Res. Commun.* 9(1):59-69; 1977.

The mechanism by which silybin corrects ethanol- and ethionine-induced changes in phospholipid metabolism was investigated in the livers of female Wistar rats treated with a single dose of ethanol (0.6 g/100 g, p.o.) or with DL-ethionine (2 ml/150 g at 1, 8, 24, 32, and 48 hr, s.c.). Ethanol significantly increased the incorporation rate of labeled orthophosphate (10 μCi, i.p.) into liver phosphatidylcholine (Ptd-Cho, 14.7 ± 1.62 counts per minute [cpm]/μg phospholipid [P] in control experiments versus 20.9 ± 2.14 cpm/μg P, $p<0.001$), but did not affect orthophosphate incorporation into liver phosphatidylethanolamine (Ptd-Etn). Ethionine treatment inhibited the incorporation of labeled phosphate into both Ptd-Cho (16.1 ± 2.11 cpm/μg P versus 6.7 ± 0.86 cpm/mg P, $p<0.001$) and Ptd-Etn (11.2 ± 1.32 cpm/μg P versus 5.4 ± 0.61 cpm/μg P, $p<0.001$). The administration of silybin hemisuccinate sodium salt (150.6 mg/kg/day, i.v., corresponding to 100 mg/kg/day silybin base) for 5 days before the administration of ethionine or ethanol resulted in a Ptd-Cho level in the ethanol-treated rats nearly as low as the control level (15.2 ± 2.16 cpm/μg P). This result was probably due to the fact that the administration of silybin alone slightly decreased the rate of phosphate incorporation into lipid. Silybin administration significantly increased the rate of labeled phosphate into both Ptd-Cho (10.1 ± 1.12 cpm/μg P) and Ptd-Etn (7.5 ± 0.89 cpm/μg P) in the ethionine-treated rats, although not to control levels. In the untreated rat liver, silybin treatment did not inhibit phospholipid synthesis from choline, ethanolamine, or phosphate. The results suggest that the effect of silybin on the normal liver is different from that in ethanol- or ethionine-induced fatty liver, which is probably a result of a change in membrane structure in the fatty liver.

0938 THE INTERACTION OF HEPATOCYTE PLASMA MEMBRANES WITH AN AZIDE DERIVATIVE OF PROCAINE. (Eng.) Levy, D.; Glover, E.; Cheng, S. (Univ. Southern California, Sch. Medicine, Los Angeles, CA 90033). *Biochim. Biophys. Acta* 469(2):194-201; 1977.

The binding sites of procaine were characterized in rat liver plasma membranes. A photoreactive derivative of procaine, *p*-azidobenzoyldiethylaminoethanol hydrochloride, was synthesized and used as a site-directed probe to label hepatocyte plasma membranes. The procaine derivative was shown to have membrane binding and Ca^{2+} displacement characteristics quite similar to that of procaine. Photolysis of the derivative in the presence of hepatocyte plasma membranes resulted in the covalent incorporation of the probe into both the protein and lipid fractions. Analysis of the labeled membranes by sodium dodecyl sulfate-polyacrylamide gel electrophoresis indicated that one membrane protein was significantly labeled with a molecular weight of 21,400 in addition to membrane lipids. Both binding and labeling could be inhibited in the presence of an excess of procaine. The labeled membrane components may be involved in the binding of Ca^{2+} to the membrane system.

0939 THE METABOLISM OF CHYLOMICRON REMNANT BY ISOLATED PERFUSED RAT LIVER. (Eng.) Cooper, A. D. (Stanford Univ. Sch. Medicine, Stanford, CA 94305). *Biochim. Biophys. Acta* 488(3):464-474; 1977.

The isolated perfused rat liver was used to study the hepatic metabolism of chylomicron remnants and to assess the hypothesis that they are the lipoprotein particles of dietary origin that can exert physiologic regulation of hepatic cholesterol synthesis. When whole chylomicrons containing radiolabeled lipids were added to the perfusate of an isolated liver, virtually no cholesterol ester or triacylglycerol was removed during the first hour, while a small amount of free cholesterol disappeared. After 3 hr, 40% of the cholesterol ester was removed by the liver. When chylomicron remnants, prepared by incubation of chylomicrons with postheparin plasma and containing the same amount of cholesterol, were added to the perfusate, 76 ± 7% of the cholesterol ester was removed in the first hour. Moreover, free cholesterol and triacylcerol disappeared from the perfusate at the same rate as the cholesterol ester, and, during the early phase of the perfusion, the total perfusate cholesterol content declined by the same amount as the radioactive cholesterol content. These results suggest a specific removal of the intact lipoprotein particle. Of the cholesterol ester removed, 42% was hydrolyzed to free cholesterol after 3 hr. When whole chylomicrons, containing the same amount of cholesterol, were injected into rats *in vivo*, 71 ± 4% of the cholesterol ester was removed by the liver in 3 hr, and 53% of this was hydrolyzed. The activity of 3-hydroxy-3-methylglutaryl-coenzyme A reductase, the rate-limiting enzyme of cholesterol synthesis, increased during liver perfusion with plasma-free or chylomicron-containing perfusate while addition of chylomicron remnants to the perfusate significantly diminished the effect. It is concluded that the chylomicron remnant is the lipoprotein of alimentary origin that regulates hepatic cholesterol synthesis, and that its metabolism by isolated liver appears to reflect the hepatic component of chylomicron metabolism *in vivo*.

0940 BILE CANALICULAR MEMBRANE PATHOLOGY IN CYTOCHALASIN B-INDUCED CHOLESTASIS. (Eng.) Oda, M.; Phillips, M. J. (Dept. Pathology, Univ. Toronto, 100 College St., Toronto, Ontario, Canada). *Lab. Invest.* 37(4):350-356; 1977.

The mechanism of cytochalasin B-induced intrahepatic cholestasis was examined in both isolated Wistar rat hepatocytes and *in vivo* infused liver using electron cytochemical techniques. Markers were used for three canalicular membrane components, namely ruthenium red for the glycoprotein-rich surface coat, the Mg^{2+}-ATPase reaction as an example of a membrane-bound protein, and uranyl acetate *en bloc* and ruthenium red staining for the canalicular membrane-associated microfilaments. In rat liver infused *in vivo* with cytochalasin B, reduction in bile flow correlated with bile canalicular dilation, loss of the ruthenium red-positive surface coat from the canalicular membrane, and loss of demonstrable Mg^{2+}-ATPase activity. In addition, structural alterations in microfilaments with widening of the ectoplasmic zone were noted. In isolated liver cells, identical changes were found. Bile canaliculi isolated from the *in vivo* cytochalasin B-infused rat liver lacked their normal investment of microfilaments. Detachment of the filaments from the bile canalicular membrane may be involved in the mechanism of cytochalasin B-induced cholestasis.

0941 THE EFFECT OF DIETARY PROTEIN DEPRIVATION ON PROTEIN SYNTHESIS IN THE ISOLATED LIVER PARENCHYMAL CELL.

(Eng.) Grant, A. G.; Hoffenberg, R. (St. George's Hosp. Medical Sch., Cranmer Terrace, Tooting, London SW17 0RE, England). *Br. J. Nutr.* 38(2):255-260; 1977.

Protein synthesis was compared in hepatic parenchymal cells from normal rats and from rats that had been deprived of dietary protein for 3 weeks. The cells from protein-deprived rats were two-thirds the diameter of those derived from livers of normal animals, and they consumed oxygen at a rate of 16.2 ± 2.7 µl/hr/10^6 viable cells, half the normal value. Albumin and transferrin were synthesized at rates of 0.94 ± 0.12 and 0.60 ± 0.07 µg/hr/10^6 viable cells, resp., and urea at a rate of 0.77 ± 0.12 µg/hr/10^6 cells from protein-deprived rats, which represents a 25-50% decrease in the rates of synthesis measured in cells isolated from normal livers. The 50% decrease in O_2 consumption in cells from protein-deprived rats is compatible with their smaller diameter and volume and suggests a decrease in either the size or number of mitochondria in each cell. The maintenance of cell viability and the inability of essential and nonessential amino acids to increase protein or urea synthesis in these cells suggests that the overall adaptation to protein deprivation is a general reduction in cell size rather than the withdrawal of cells from protein synthesis.

0942 CATABOLISM OF α-FETOPROTEIN IN CARBON TETRACHLORIDE-INJURED RATS.

(Eng.) Watanabe, A.; Miyazaki, M. (Okayama Univ. Medical Sch., Okayama 700, Japan). *Acta Hepatogastroenterol.* 24(4):238-240; 1977.

The rate of alpha-fetoprotein (AFP) catabolism was determined in male Sprague-Dawley rats with carbon tetrachloride-induced liver injury and compared with that in normal rats. The rate of AFP catabolism in CCl_4-treated rats was estimated to be essentially the same as that found in control adult and young rats. The blockade of the reticuloendothelial system by carbon particles resulted in slightly shorter values for AFP half-life. The amount of AFP synthesized per day in CCl_4-treated rats was calculated to be nearly 10 times that in controls. Thus, the elevation of serum AFP concentrations in CCl_4-treated rats is derived from increased AFP synthesis by the injured liver.

0943 THE INFLUENCE OF INCREASED HEPATIC SEQUESTRATION AFTER SPLENECTOMY ON THE SURVIVAL AND OSMOTIC FRAGILITY OF RED CELLS IN RATS, WITH REFERENCE TO PROTEIN LEVELS IN DIETS.

(Eng.) Hisaoka, F.; Shiraki, K.; Sagawa, S. (Sch. Medicine, Tokushima Univ., 3 Kuramotocho, 770 Tokushima, Japan). *J. Nutr. Sci. Vitaminol.* 23(3): 237-247; 1977.

The sequestration of RBC in rats by the liver following splenectomy was studied using an isologous ^{51}Cr-labeled population of either normal or *N*-ethylmaleimide (NEM) treated RBC. The spleen sequestered the damaged RBC selectively, while the liver compensated and overshot the sequestration for spleen after splenectomy. The sequestering response in liver increased gradually, reaching a maximum level 8 weeks after splenectomy and then declined toward the control level. These compensatory responses in liver were not observed in rats fed a low-protein diet, which indicated that the proliferative response imposed on liver by an extra work after splenectomy was not stimulated in the rats fed a low-protein diet. Splenectomy prolonged RBC survival and reduced the osmotic fragility of normal RBC, but the compensatory increase in sequestration of damaged RBC in the liver did not alter the survival and osmotic fragility of normal RBC of the rat. These findings indicate that the increased sequestration of reticuloendothelial cells in the liver is basically reparative and that it is impossible to compensate for the absence of the spleen because of an inability to duplicate certain anatomic features peculiar to the spleen.

0944 EFFECT OF GLUCOCORTICOID ON PROSTAGLANDIN PRODUCTION DURING SIMULATED SHOCK CONDITIONS IN THE PERFUSED CAT LIVER.

(Eng.) Carlson, R. P.; Flynn, J. T.; Lefer, A. M. (Jefferson Medical Coll., Philadelphia, PA 19107). *Biochem. Pharmacol.* 26(16):1463-1468; 1977.

The production of prostaglandins E_2 and $F_{2\alpha}$ by isolated perfused cat livers was quantitated during separate simulated shock conditions (i.e., ischemia, acidosis, and hypoxia). Control livers showed little change in perfusate prostaglandin concentrations over a 150-min perfusion period. Neither ischemia nor acidosis produced significant increases in prostaglandin concentrations in the perfusate after 150 min of perfusion. Hypoxia resulted in a 4.5-fold increase in PGE_2 and a 3.5-fold increase in $PGF_{2\alpha}$ concentrations during this same period. Lactic acid dehydrogenase and cathepsin D activities were also elevated in the perfusate during hypoxia. The addition of methylprednisolone (10^{-3} M) to the perfusate significantly retarded the release of PGE_2, $PGF_{2\alpha}$, and cathepsin D into the perfusate during severe hypoxia, without significantly altering the increase in lactic acid dehydrogenase activity. The action of methylprednisolone on prostaglandin and lysosomal enzyme release in hypoxic livers may be the result of a membrane-stabilizing action of the glucocorticoid. One possible mechanism for the inhibition by glucocorticoids of the increased prostaglandin production during hypoxia is that endogenous arachidonic acid is stabilized within the cell membrane phospholipids, thus, less substrate is available for utilization by the prostaglandin synthetase system.

0945 THE EFFECT OF ANOXIA ON NITROGEN METABOLISM IN THE ISOLATED PERFUSED RAT LIVER. (Eng.)

Parrilla, R.; Goodman, M. N.; Toews, C. J. (Dept. Metabolism, Inst. G. Maranon, C.S.I.C., Madrid, Spain). *Pfluegers Arch.* 369(2):167-175; 1977.

The roles of different substrates and of anoxia in hepatic alanine metabolism were studied to elucidate the metabolic situations that would cause a reversal of the normal alanine flux from the extra- to the intra-cellular hepatic spaces. The total nitrogen balance of the liver was accounted for by proteolysis; production of alanine, glutamine, urea, and ammonia; and uptake of pyruvate, alanine, or glutamine uptake. The rate of alanine production was a function of the hepatic alanine concentration when it was not added as a substrate. Anoxia increased hepatic alanine production, largely due to an increased rate of proteolysis (chiefly of glutamate). However, a decrease in the glutamate level in the liver could not account for the increased alanine, thus suggesting intramitochondrial synthesis of glutamate that is then transferred to the cytosol. The mitochondrial $(NAD^+)/(NADH)$ ratio calculated from the glutamate or β-hydroxybutyrate dehydrogenase reactions was the same in both control and hypoxic livers, suggesting that the two enzymes are in equilibrium with the mitochondrial nicotinamide nucleotide pool. Anoxia had marked effects on nitrogen balance in the liver. When pyruvate was the substrate, the total hepatic nitrogen production increased, with most of the increase accounted for by alanine production. It is concluded that pyruvate availability is the critical factor in determining the rate of alanine production under all conditions studied and that increased proteolysis is the significant factor for increased hepatic nitrogen production during anoxia.

0946 DIFFERENTIAL ACTION OF PROGESTERONES ON HEPATIC MICROSOMAL ACTIVITIES IN THE RAT.

(Eng.) Feuer, G.; Kardish, R.; Farkas, R. (Banting Inst., Toronto, Ontario M5G 1L5, Canada). *Biochem. Pharmacol.* 26(16):1495-1499; 1977.

To test the hypothesis that changes in normal steroid balance could influence the metabolism of drugs and the pattern of liver response, the effect of the administration of reduced derivatives of progesterone (5α-pregnane-3β-ol-20-one, 5β-pregnane-3α-ol-20-one, 5α-pregnane-3β,20β-diol, and 5β-pregnane-3α,20α-diol) on the microsomal hydroxylation of selected drugs and of progesterone was measured in rats. The s.c. administration of these steroids in seven daily doses (20 mg/kg) significantly reduced the activities of aminopyrine *N*-demethylase, coumarin 3-hydroxylase, and glucose 6-phosphatase in hepatic microsomes. These steroids slightly raised inosine diphosphatase activity. 16α-Hydroxyprogesterone and pregnenolone-16α-carbonitrile significantly increased drug metabolism and slightly elevated glucose 6-phosphatase. The contrasting action of the different progesterone derivatives was associated with changes in microsomal phospholipid synthesis. Pregnanolone and pregnanediol significantly decreased the *de novo* incorporation of [^{14}C-methyl]-L-methionine into microsomal phospholipids, mainly manifesting in phosphatidylcholine, phosphatidylethanolamine, and lysophosphatidylcholine fractions; reduced the activity of S-adenosyl-L-methionine:microsomal-phosphatidylethanolamine methyl transferase; and caused a reduction of total microsomal phosphatidylcholine:phosphatidylethanolamine ratio. In contrast, 16α-hydroxy-progesterone and pregnenolone-16α-carbonitrile increased the *de novo* synthesis of microsomal phospholipids, methyl transferase activity, and the ratio of total microsomal phosphatidylcholine: phosphatidylethanolamine. Treatment with reduced progesterone derivatives diminished microsomal progesterone hydroxylation in the 16α- and 6β-position and raised progesterone Δ^4-5α-dehydrogenase activity measured *in vitro*. 16α-Hydroxyprogesterone and pregnenolone-16α-carbonitrile elevated progesterone hydroxylation. Considering these opposite effects, it can be postulated that, in the rat, the induction of drug metabolizing activity of the hepatic endoplasmic reticulum might be controlled by a balance displayed in the synthesis and metabolism of various progesterone derivatives.

0947 BIOTRANSFORMATION OF DRUGS AND THEIR INTERACTION WITH BARBITURATES. (Ger.)

Remmer, H. (Institut fur Toxikologie, Universitat Tubingen, Wilhelmstr. 56, 7400 Tubingen, W. Germany). *Z. Gastroenterol.* 15(6):362-372; 1977.

Studies on drug metabolism by liver enzymes are reviewed. The formation of oxidized compounds is the first step of the enzymatic biotransformation of drugs in the liver, which gives rise to radical intermediates that may elicit toxic action if not removed immediately by consecutive enzymatic reactions. The problem of liver enzyme induction by prescription drugs is generally overemphasized; the therapeutic doses used are normally too low to evoke increased enzyme production. Only few therapeutic drugs are known to act as enzyme inducers, either because they have to be used in high doses (e.g., rifampicin) or because of their ability to accumulate during treatment (e.g., phenobarbital, phenytoin). The inducing action is dependent on the drug concentration in the liver and inversely related to the rate of the breakdown of the drug. Inhibition of drug metabolism seems to be more important in therapy: as exogenous and endogenous liposoluble compounds compete for the binding sites of the oxidizing and conjugating enzymes, the release of a drug from the enzyme site depends on the concentration and affinity of the displacing agent. Only drugs administered in a high dose range are able to inhibit the metabolism of another drug administered in a lower dose. Such competitive inhibition of metabolism leads to an increase in the therapeutic effect, and possibly also the toxic effect, of the drug whose metabolism is inhibited. If a drug produces the same therapeutic effect and has a similar therapeutic index as another drug, but is administered in a lower dose, an interaction with the second drug is very unlikely. Such combinations of drugs should be preferably prescribed to prevent interactions.

0948 EFFECT OF EXPERIMENTAL HEPATIC INJURY ON IN VITRO DRUG-METABOLIZING ENZYME ACTIVITIES IN THE RAT.

(Eng.) Willson, R. A.; Hart, F. E. (Harborview Medical Center, 325 9th Ave., Seattle, WA 98104). *Gastroenterology* 73(4):691-696; 1977.

The relationship between *in vitro* drug metabolism, liver necrosis, and liver function test results was studied in male Sprague-Dawley rats with acetaminophen-induced liver injury. Hepatic necrosis was induced in phenobarbital-pretreated rats by the i.p. administration of an acetaminophen-dimethyl sulfoxide mixture (0.3-1.5 g/kg). At lower doses, cytochrome P-450 concentration and the specific activities of aminopyrine demethylase and bilirubin glucuronyl transferase increased, whereas aniline hydroxylase activity was mildly decreased. In contrast, at higher doses, cytochrome P-450 concentration and the specific activities of all of the enzymes were decreased significantly ($p<0.01$), as compared with control rats. The diminished activities, however, were generally modest, not uniform for all enzymes assayed, and correlated poorly with histological necrosis and routine laboratory tests. When necrosis was severe, a prominent peak was detected at 420 nm, and this was associated with a more consequential decrease in all of the enzyme activities. When the total *in vitro* hepatic drug metabolizing enzyme capacity was calculated, only the cytochrome P-450 content and aminopyrine demethylase activity were significantly decreased at the 1.5-g/kg dose. It is concluded that, in acute liver disease, changes in the hepatic *in vitro* drug metabolizing enzyme capacity may not be closely related to cellular necrosis, *per se*, and the degree of change in enzyme activities varies from one enzyme system to another. These findings may explain, in part, the often inconsistent alterations in the disposition and elimination of drugs described in associated liver diseases.

0949 INTERFERENCE OF CCl_4 METABOLITES WITH SUBCELLULAR STRUCTURES.

(Eng.) Dianzani, M. U.; Gabriel, L.; Gravela, E.; Paradisi, L. (Istituto di Patologia Generale, Corso Raffaello 30, Torino, Italy). *Panminerva Med.* 18(9/10):310-319; 1976.

The effect of aldehydes and ketoaldehydes on the amino acid incorporating activity of the postmitochondrial supernatant from rat liver was studied to determine whether these substances, which are produced during the peroxidation of unsaturated fatty acids, could be involved in carbon tetrachloride-induced liver injury. *In vitro* protein synthesis was inhibited by 10 mM malonyldialdehyde, 5 mM 2-ketopentanal, 1 mM 4-hydroxypentenal, and 0.25 mM malealdehyde. Thiol compounds protected against 4-hydroxypentenal- and malealdehyde-induced inhibition of protein synthesis, indicating that the inhibition is dependent upon a blocking of sulfhydryl groups. CCl_4 (50 mM) inhibited polyuridine-directed phenylalanine incorporation in the postmitochondrial supernatant to 54% of the control level. The degree of inhibition was not affected by NADPH, and antioxidants did not protect against the inhibi- 0.1 mM $CBrCl_3$. This inhibition was intensified by NADPH. Polyuridine-directed polyphenylalanine synthesis was more severely impaired than was endogenous messenger RNA-dependent synthesis.

0950 ADVERSE EFFECTS OF CHLORPROMAZINE METABOLITES ON ISOLATED HEPATOCYTES.

(Eng.) Abernathy, C. O.; Lukacs, L.; Zimmerman, H. J. (Veterans Admin. Hosp., 50 Irving St., N.W., Washington, DC 20422). *Proc. Soc. Exp. Biol. Med.* 155(4):474-478; 1977.

Chlorpromazine (CPZ) and several of its metabolites were tested for *in vitro* cytotoxicity, as measured by the efflux of aspartate aminotransferase to the surrounding medium, toward isolated rat hepatocytes. Exposure of liver cells to CPZ (9 x 10^{-5} M) led to enzyme leakage. The demethylated metabolites, mono- and didesmethyl-CPZ, were three and six times, resp., more potent than CPZ. Hydroxylation of the tricyclic ring at the 7 or 8 position gave rise to compounds that were slightly less active than the parent compound, while oxidation of the sulfur atom resulted in inactive analogs. The presence of calcium in the medium had no apparent effect on the response of the hepatocytes to CPZ. The results are consistent with the hypothesis that certain drugs, which cause jaundice in a small percentage of patients, possess a slight intrinsic toxicity.

0951 COMPARATIVE TOXICITIES OF ENFLURANE, FLUROXENE AND NITROUS OXIDE AT SUBANAESTHETIC CONCENTRATIONS IN LABORATORY ANIMALS.

(Eng.) Stevens, W. C.; Eger, E. I., II; White, A.; Biava, C. G.; Gibbons, R. D.; Shargel, R. (Univ. California Medical Center, 436S, San Francisco, CA 94143). *Can. Anaesth. Soc. J.* 24(4):479-490; 1977.

The toxicities of subanesthetic concentrations of fluroxene, enflurane, and nitrous oxide were compared in mice, rats, and guinea pigs, which were all young and in an active growth phase. Fluroxene (>0.001% of air delivered in a closed chamber) produced a greater mortality and decrement in weight gain than did enflurane and nitrous oxide, despite the administration of far lower concentrations. All species that received 0.2% enflurane gained less weight than controls. Reduction of enflurane to 0.07% reduced the detrimental effect on all species. Five male mice receiving 0.2% enflurane died by day 5, and by day 17, nine male and six female mice receiving 0.07% died. No rats receiving enflurane died. One male and two female guinea pigs that received 0.07% enflurane died. Of the controls, only one guinea pig died. Mice treated with 20% nitrous oxide gained more weight than controls. Experimental and control rats had similar weight gain, but experimental guinea pigs gained less weight than controls. Of the experimental animals, only two guinea pigs died, whereas two mice and one guinea pig in the control group died. Control female mice for the 0.01% fluroxene group were significantly heavier than the experimental mice before anesthesia administration, and this difference increased significantly at 4 days. Experimental male mice receiving 0.003% fluroxene were significantly heavier than the control mice before anesthesia, but this difference was reversed in only 5 days. Fluroxene was lethal to mice at 0.003%, and was poorly tolerated by any species for even brief periods at 0.01%. Nitrous oxide (0.1 minimum alveolar concentration) resulted in an increased incidence of focal inflammatory liver changes in mice (occurring in 5/15 controls and 34/42 experimental animals). Renal tubule calcification occurred in 2 of 7 controls and 5 of 10 experimental guinea pigs. Histologic changes produced by the other two agents were inconsistent. This study confirms the toxicity of fluoroxene in laboratory animals.

0952 THE ROLE OF BILIARY EXCRETION IN THE HEPATOTOXICITY OF FUROSEMIDE IN THE MOUSE.

(Eng.) Spitznagle, L. A.; Wirth, P. J.; Boobis, S. W.; Thorgeirsson, S. S.; Nelson, W. L. (Dept. Pharmaceutical Sciences, Univ. Washington, Seattle, WA 98195). *Toxicol. Appl. Pharmacol.* 39(2):283-294; 1977.

The distribution of furosemide in the whole body and its binding to plasma proteins were studied in adult male Swiss-Webster mice or Swiss albino mice to elucidate the importance of biliary excretion in the hepatotoxicity of furosemide. Whole-body autoradiography (after administration, i.v. or i.p., of ^{35}S-furosemide, 150-300 mg/kg) showed that large amounts of furosemide and its metabolites accumulated in the gastrointestinal tract and that the excretory process through the biliary tract proceeded by a saturable, dose-dependent mechanism. More than 30% of the furosemide was excreted in the bile after doses of 50 and 100 mg/kg, but considerably less was excreted at higher doses. BSP administration decreased the biliary excretion and increased hepatic necrosis of furosemide (necrosis index was 2.63 when BSP was given with furosemide as compared to 1.07 with furosemide alone). However, equilibration of BSP with serum did not affect the binding of furosemide (5-500 μg/ml) to serum proteins. Two classes of binding sites for furosemide, differing in their association constants (KA), were found in the serum: K_A=7.5 x 10^4 and 1.1 x 10^3. Total metabolism of furosemide and its covalent binding to liver proteins increased with increasing doses of the drug and correlated with corresponding increases in hepatotoxicity. It is concluded that biliary excretion is of considerable importance in the elimination of potentially hepatotoxic doses of furosemide in the mouse and that blocking this pathway (saturation with furosemide or BSP) leads to the observed hepatic necrosis.

0953 α-NAPHTHYLISOTHIOCYANATE (ANIT) HEPATOTOXICITY AND IRREVERSIBLE BINDING TO RAT LIVER MICROSOMES.

(Eng.) El-Hawari, A. M.; Plaa, G. L. (Faculte de Medecine, Universite de Montreal, Montreal, Quebec, Canada). *Biochem. Pharmacol.* 26(20):1857-1866; 1977.

Experiments were carried out to determine whether the irreversible binding of α-naphthylisothiocyanate (ANIT) to hepatic macromolecules is related to its hepatotoxic effect. The binding of a chemically reactive ANIT-derived product to rat liver microsomes was examined *in vitro*. When [^{3}H]ANIT or [^{14}C]ANIT was incubated with rat liver microsomes, radioactivity was bound irreversibly to proteins. This binding occurred in the absence (nonenzymic) and, to greater extent, in the presence (enzymic) of NADPH and oxygen. Enzymic binding was inhibited by carbon monoxide, β-diethylaminoethyl diphenylpropylacetate (SKF 525-A), and piperonyl butoxide, indicating that a cytochrome P-450-dependent, mixed-function oxidase mediated the binding. The enzymic binding was reduced by incubation with glutathione and other thiol-containing compounds, while incubation with β-naphthylisothiocyanate or phenylisothiocyanate inhibited both the enzymic and nonenzymic binding. Pretreatment of rats with phenobarbital or 3-methylcholanthrene enhanced ANIT toxicity *in vivo* and markedly increased the irreversible binding *in vitro*. Piperonyl butoxide, SKF 525-A, disulfiram, and cobaltous chloride reduced ANIT toxicity and its binding to microsomes *in vitro*. However, cycloheximide, which abolished ANIT toxicity *in vivo*, failed to affect the binding. Furthermore, 16-α-pregnenolone carbonitrile reduced ANIT toxicity *in vivo* but increased its enzymic binding. The results demonstrate an inconsistent correlation between toxicity of ANIT *in vivo* and its binding to microsomal proteins *in vitro* and indicate that binding *in vitro* in itself is not a valid index of ANIT-induced hyperbilirubinemia. Limited studies *in vivo* in which the irreversible binding to liver proteins was examined after p.o. ANIT administration indicated that the extent of binding after different pretreatments also did not parallel ANIT toxicity. These data cast doubt on the role of such binding in the pathogenesis of ANIT-induced cholestasis.

0954 MICROSOMAL HEXOBARBITAL METABOLIZING ENZYMES IN REGENERATING CHOLESTATIC RAT LIVER.

(Eng.) Ahonen, J.; Aronsen, K. F. (Helsinki Univ. Central Hosp., Helsinki, Finland). *Eur. Surg. Res.* 9(4):264-269; 1977.

Microsomal changes were studied in regenerating cholestatic rat liver by measuring hexobarbital metabolizing capacity (HMC) *in vitro*. Total extrahepatic biliary obstruction was induced in male Sprague-Dawley rats by common duct ligation, and 3 days later a 70% hepatectomy was carried out. In sham-operated control rats, hepatectomy resulted in a clear reduction in HMC. On day 7 after hepatectomy, an increase in HMC was observed. In the duct-ligated group, the initial value of HMC was reduced as compared with that in the sham-operated animals. Liver resection caused a further reduction in the activity, but the HMC activity started to increase at the same time as that in the sham-operated group. The similarity of the pattern of microsomal regeneration in duct-ligated and sham-operated rats indicates that cholestasis per se does not interfere with the development of the microsomal hexobarbital metabolizing enzyme system during regeneration.

0955 INDUCTION OF LIVER LYSOSOMAL ENZYMES DURING THE AUTOPHAGIC PHASE FOLLOWING PHENOBARBITAL TREATMENT OF RAT. (Eng.) Glaumann, H.; Arborgh, B.; Lindeborg, T. (Karolinska Institutet, Box 6401, S-113 82 Stockholm, Sweden). *Virchows Arch.* [*Cell Pathol.*] 23(1):17-28; 1977.

To find a possible biochemical correlation to the increased occurrence of autophagy observed after phenobarbital treatment, hydrolytic (lysosomal) enzymes were analyzed in rats during the autophagic phase. Male rats received phenobarbital (8 mg/100 g) i.p. either as a single dose or once daily for 7 days. The effects of treatment on the lysosomal hydrolases, acid phosphatase, cathepsin D, and aryl sulfatase were analyzed at different intervals ranging from 1 to 15 days after seven injections, and from 1 to 48 hr after a single injection. In both cases, microsomal protein and NADPH-cytochrome c reductase were measured to ensure proper induction. After a single injection, a slight decrease in hydrolytic activities was observed. Repeated administration of phenobarbital gave rise to a marked decrease of lysosomal enzyme activities 1 day after cessation of treatment. This decrease was followed by a continuous increase in activity up to days 3 and 4. One or 2 weeks after treatment, enzyme activities declined to control values. The increase in activity of lysosomal hydrolytic enzymes was correlated with the onset of induced autophagy of endoplasmic reticulum membranes described as occurring in liver upon cessation of phenobarbital exposure. It is concluded that phenobarbital treatment *per se* decreases lysosomal enzyme activities, whereas the induced autophagy following cessation of exposure is associated with enhanced levels of lysosomal hydrolases in rat liver.

0956 CYCLIC EXCRETION OF HEPATITIS A VIRUS IN EXPERIMENTALLY INFECTED CHIMPANZEES: BIOPHYSICAL CHARACTERIZATION OF THE ASSOCIATED HAV PARTICLES. (Eng.) Bradley, D. W.; Gravelle, C. R.; Cook, E. H.; Fields, R. M.; Maynard, J. E. (Center for Disease Control, 4402 North Seventh St., Phoenix, AZ 85014). *J. Med. Virol.* 1(2): 133-138; 1977.

The excretion pattern of hepatitis A virus (HAV) particles was studied in two experimentally infected chimpanzees to examine its relation to SGPT activity. The two chimpanzees were infected with Phoenix antigen of HAV. Radioimmunoassay of daily 10% stool suspensions showed a cyclic excretion of virus particles on days 9-11, 14-15, and 20-21 post-inoculation and a maximum in SGPT activity on days 30-31. Immune electron microscopy of stool filtrates showed the presence of predominantly empty (electron-lucent) HAV particles on day 10, but predominantly complete (electron-dense) HAV particles on day 14, suggesting that virus particles with different biophysical properties might be found in stools collected at different times after inoculation of the animal. Isopycnic banding in CsCl gradients of stool suspensions (17%) prepared from 9-11, 14-15, and 17, 19, and 21 day stool pools showed multiple buoyant densities for the associated HAV particles. Hollow HAV particles found in the 9-11 day pool banded primarily at a buoyant density of 1.30 g/cm^3. HAV particles in the 14-15 day pool and in the 17, 19, and 21 day pool banded bimodally with antigen peaks at buoyant densities of 1.29 and 1.33 g/cm^3 (14-15 day) and 1.33 and 1.40 g/cm^3 (17, 19, and 32 day), resp. Replication of HAV in experimentally infected chimpanzees is accompanied by the cyclic excretion of HAV particles that exhibit varying buoyant densities in CsCl gradients.

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0998 EXCHANGE TRANSPLANTATION OF THE LIVER IN THE PIG. (Eng.) Hickman, R. v. H.; Van Hoorn, W. A.; Terblanche, J. (Medical Sch., Univ. Cape Town, Observatory 7925, Cape Town, South Africa). *Transplantation* 24(4):237-242; 1977.

0999 LIPIDS IN STIMULATED DUODENAL CONTENTS ACCURATELY REFLECT GALLBLADDER BILE COMPOSITION [Abstract]. (Eng.) McCone, J.; Trotman, B. W.; Soloway, R. D. (Univ. Pennsylvania Hosp., Philadelphia, PA). *Gastroenterology* 73(5): 1233; 1977.

1000 WHY MAMMALS REDUCE BILIVERDIN [Abstract]. (Eng.) Palma, L.; McDonagh, A. F.; Schmid, R. (Liver Center, Univ. California, San Francisco, CA 94143). *Gastroenterology* 73(5): 1238; 1977.

1001 ISOLATION OF AN ORGANIC ANIONIC DYE (OAD) BINDING PROTEIN FROM RAT LIVER PLASMA MEMBRANE (LPM) [Abstract]. (Eng.) Reichen, J.; Berk, P. D. (Natl. Inst. Arthritis, Metabolic and Digestive Diseases, Natl. Inst. Health, Bethesda, MD). *Gastroenterology* 73(5):1242; 1977.

1002 SPECTROBILIMETRY--A NEW METHOD FOR MONITORING HEPATIC PIGMENT EXCRETION IN RATS [Abstract]. (Eng.) Ramonas, L. M.; McDonagh, A. F. (Liver Center, Univ. California, San Francisco, CA). *Gastroenterology* 73(5):1242; 1977.

1003 EFFECT OF MEDIUM pH ON FECAL BILE ACID DEGRADATION [Abstract]. (Eng.) Macdonald, I. A.; Singh, G.; Mahony, D. E.; Meier, C. E. (Dept. Medicine, Dalhousie Univ., Halifax, Nova Scotia, Canada). *Clin. Res.* 25(5):688A; 1977.

1004 SYNTHESIS OF BILE ACID CONJUGATES IN EXPLANTS OF HUMAN FETAL LIVER [Abstract]. (Eng.) Haber, L. R.; Vaupshas, V.; Vitullo, B. B.; de Belle, R. C. (Montreal Children's Hosp., Montreal, Quebec, Canada). *Clin. Res.* 25(2):688A; 1977.

1005 INFLUENCE OF LIVER CIRRHOSIS ON THE METABOLISM OF $[4\text{-}^{14}C]$OESTRONE IN RAT LIVERS [Abstract]. (Eng.) Holler, M.; Dengler, K.; Breuer, H. (Institut fur Klinische Biochemie, D-5300 Bonn-Venusberg, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1220-1221; 1977.

1006 METABOLIC ZONATION OF LIVER PARENCHYMA INTO GLUCOGENIC AND GLYCOLYTIC HEPATOCYTES [Abstract]. (Eng.) Jungermann, K. (Biochemisches Institut, Universitat Freiburg, Hermann-Herder-Str. 7, D-7800 Freiburg, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1225-1226; 1977.

See also, 0784, 0788, 0790, 0834, 0891, 1019, 1037, 1078, 1100, 1108, 1136, 1234, 1275, 1377, 1389, 1391, 1408, 1472, 1481, 1488, 1491, 1527, 1535, 1536.

SECRETION AND METABOLISM

Intestine

1007 EFFECT OF LUMENAL CONTENTS ON COLONIC CELL REPLACEMENT. (Eng.) Stragand, J. J.; Hagemann, R. F. (Allegheny General Hosp., Pittsburgh, PA 15212). *Am. J. Physiol.* 233(3): E208-E211; 1977.

The role of physical versus nutritional stimulation in the response of colonic cell proliferation to fasting and refeeding (marked depression and transient stimulation, resp.) was evaluated in HA/ICR mice via a nondestructive colonic ligation procedure. The mice were fasted for 24 hr to remove food from the intestinal lumen. The colon was then ligated at the ascending region, 2 cm from the ileocecal junction. The fast was continued for an additional 48 hr. The mice were then refed for 8 hr, injected with tritiated thymidine, and sacrificed. The side of the colon proximal to the ligation and in contact with the food showed a dramatic response to refeeding (425 ± 75% greater cell renewal than that in sham-operated, nonfasting controls), whereas the side distal to the ligation remained depressed at the fasting level. The magnitude of ligation-induced colonic distention was such that the diameter of the proximal region of fasted and ligated animals was 1.5 times that of the controls and 2.6 times that of the distal region. The distal region of a fasted and ligated animal did not differ significantly from that of a fasted-only animal. The differences between the proximal and distal regions were similar in magnitude to that seen within 8 hr after refeeding; the colonic diameter was increased 2.1 times from the fasting level. Ligation produced a marked increase in the proliferative activity of the proximal colon within 48 hr, and the hyperproliferation occurred despite continued fasting stress. The region distal to the ligation remained depressed throughout. The results suggest that physical stimulation by lumenal factors is in part required to initiate the colonic hyperplasia seen after refeeding. Physical stimulation may be manifested through the lumenal distention produced by newly ingested food.

1008 DIETARY INFLUENCE ON COLONIC CELL RENEWAL.

(Eng.) Stragand, J. J.; Hagemann, R. F. (Allegheny General Hosp., 320 East North Ave., Pittsburgh, PA 15212). *Am. J. Clin. Nutr.* 30(6): 918-923; 1977.

The role of specific dietary components in the control of the response seen in the colon after starvation and refeeding and in normal colonic cell renewal was investigated in mice. The colonic refeeding response was dependent upon the presence of sugar, amino acids, and minerals (in the form of salts) in the refed diet. In the nonfasting animal, normal colonic cell renewal also required dietary minerals. The absence of minerals in a maintenance diet resulted in a marked hypoproliferative state that was reversed by reintroducing the mineral component of the diet. The depressed proliferative rate observed with a salt-free diet was not the result of a caloric depletion as demonstrated by the maintenance of body weight throughout the experimental period. These findings suggest a potential role for specific dietary components in the control of the colonic cell proliferation and in maintenance of the steady state cell renewal system, and represent a tool by which intestinal proliferative activity may be manipulated.

1009 ILEAL MUCOSAL CYCLIC AMP AND Cl SECRETION: SEROSAL VS. MUCOSAL ADDITION OF CHOLERA TOXIN.

(Eng.) Sheerin, H. E.; Field, M. (Harvard Medical Sch., Boston, MA 02215). *Am. J. Physiol.* 232(2):E210-E215; 1977.

The effect of adding cholera toxin to the mucosal (CT_m) and serosal (CT_s) sides of isolated rabbit small intestine on cyclic (c) AMP concentration and ion transport was studied to elucidate the relationship between cAMP and secretion. Preparations of 2-cm segments of the distal ileum of New Zealand white male rabbits, stripped of muscle, were mounted in chambers containing bicarbonate-Ringer solution (pH 7.4), glucose, and mannitol (10 µmol/ml each). The transmural potential difference, short circuit current (SCC), and electrical resistance were determined. Cholera toxin (50 µg) was added to either the mucosal or serosal reservoirs, and ion flux was measured with tracer doses of ^{22}Na and ^{36}Cl. The concentration of cAMP in the tissue was measured in a protein-kinase binding assay by adding theophylline (5 µmol/min) to the reservoirs 180 and 280 min after toxin addition; after 10 min, the tissues were placed in cold 5% trichloroacetic acid containing a tracer dose of $[^3H]$cAMP. Toxin addition to CT_m significantly increased the SCC over control values after 60 min; however, the SCC of CT_s tissues increased slowly but steadily until, 280 min after toxin addition, it was significantly greater than that of CT_m tissue. Conductance was decreased 25% by CT_m 120 min after toxin addition, but was not affected by CT_s. CT_m inhibited the SCC increase produced by theophylline to less than 20% of control values by 180 min after toxin addition, whereas CT_s inhibited the SCC response to theophylline to 41% of control values by 280 min after toxin was added. Conductance of CT_m and CT_s tissues, unlike control tissues, was not significantly decreased by theophylline added 280 min after toxin. CT_m decreased Na^+ flux in both directions and the Cl^- flux from the mucosal to the serosal side, producing net Cl^- secretion. CT_s changed the Cl^- flux slightly in the secretory direction. CT_m and CT_s increased cAMP equally, when measured 190 min after toxin and 10 min after theophylline administration. Addition of toxin to both sides produced an additive increase in cAMP. The results suggest that much of the toxin-stimulated cAMP content of the mucosa is not coupled to secretion and that active secretion is probably stimulated by cholera toxin added on the serosal side, although more slowly than after addition to the mucosal side.

1010 STIMULATION OF CDP-CHOLINE BIOSYNTHESIS BY ENANTIOMERIC LYSOPHOSPHATIDYLCHOLINES IN RAT INTESTINAL MUCOSA.

(Eng.) O'Doherty, P. J. A.; Smith, N. B.; Kuksis, A. (Dept. Biochemistry, Univ. Wisconsin, Madison, WI 53706). *Arch. Biochem. Biophys.* 180(1):10-18; 1977.

The effects of several molecular species of 3-*sn*-lysophosphatidylcholine and of 1-*sn*-lysophosphatidylcholine on the activity of phosphorylcholine cytidyltransferase were investigated in rat intestinal cells. The phosphorylcholine cytidyltransferase activity of the cytosol fractions of rat intestinal crypt and villus cells was stimulated by the addition of 3-*sn*-lysophosphatidylcholine. A 15- to 20-fold increase in activity was seen following a prior removal of phospholipids with acetone and butanol. 3-*sn*-Lysophosphatidylcholines of C_{16} and C_{18} carbon fatty acids were three to four times more effective than those with fatty chains of shorter length. The 3-*sn*-phosphatidyl and 3-*sn*-lysophosphatidyl ethanolamine, inositol, and serine were ineffective. 3-*sn*-Lysophosphatidic acid and 3-*sn*-glycerophosphorylcholine did not stimulate the transferase activity, indicating that both fatty acyl and phosphorylcholine moieties of the 3-*sn*-lysophosphatidylcholine molecule were required for the observed effect. Addition of the enantiomeric 1-*sn*-lysophosphatidylcholine had an effect comparable to that of 3-*sn*-lysophosphatidylcholine on the phosphorylcholine cytidyltransferase activity when assayed in rat intestinal mucosa and in pigeon liver. It is suggested that the stimulatory effect of lysophosphatidylcholine may be related to a specific detergent property dependent upon the peculiar balance of hydrophilic and hydrophobic components in the molecule.

1011 INTESTINAL BRUSH BORDER AND LYSOSOMAL ENZYMES AND IMMUNOGLOBULIN ABSORPTION IN THE NEWLY-BORN LAMB. (Eng.) Healy, P. J. (Veterinary Res. Station, Glenfield, New South Wales, 2167, Australia). *Aust. J. Exp. Biol. Med. Sci.* 55(3):327-337; 1977.

The activities of the brush border enzymes alkaline phosphatase, leucine aminopeptidase, and lactase and the lysosomal enzymes α-mannosidase and β-*N*-acetylglucosaminidase were studied in newborn lambs fed colostrum. The objective was to determine whether the release of intestinal alkaline phosphatase into the circulation of these lambs is a consequence of absorption of immunoglobulins. In fed lambs (0-36 hr after birth), there were differences in enzyme activities in intestine and the serum, e.g., both alkaline phosphatase and α-mannosidase activities increased in serum but at 9 hr after birth intestinal alkaline phosphatase activity was higher ($p<0.001$) and intestinal α-mannosidase activity was lower in lambs fed colostrum than in fasted lambs. In lambs fed colostrum, serum globulin concentration increased with time until 15 hr after birth (mean concentration at 15 hr, 59.8 ± 5.9 mg/ml). Feeding lipid and protein components of colostrum and bovine serum resulted in enzyme responses similar to those observed after feeding colostrum in lambs fed 0-3 hr after birth. The enzyme activities increased in mesenteric lymph collected from newly born lambs when immunoglobulins were being absorbed from the jejunum and ileum. The results are consistent with the hypothesis that proteins are absorbed by pinocytosis and then transported to the intracellular spaces of the serosal side of the cells.

1012 INDUCTION OF CHICK EMBRYONIC INTESTINAL DISACCHARIDASES BY HYDROCORTISONE AND SUCROSE IN THE ORGAN CULTURE SYSTEM. (Eng.) Yoshizawa, S.; Moriuchi, S.; Hosoya, N. (Sch. Health Sciences, Univ. Tokyo, 3-1, Hongo 7, Bunkyo-ku, Tokyo 113, Japan). *J. Nutr. Sci. Vitaminol.* 23(3):227-235; 1977.

The effect of hydrocortisone and sucrose on the development of intestinal disaccharidases was studied in the cultured chick intestine. When jejuna of 15- and 17-day-old embryos were cultured in the presence of hydrocortisone (10^{-8}-10^{-5} M), disaccharidase activity was significantly increased, compared with the control. However, hydrocortisone had no effect in 20-day embryonic intestines. On the other hand, the disaccharidase activity of cultured intestines from 20-day-old chick embryos was significantly stimulated by the addition of sucrose. The increase in disaccharidase activity induced by hydrocortisone administration in 17-day-old embryos *in vitro* was inhibited 60% by actinomycin D and 70-100% by cycloheximide. The activity induced by the administration of sucrose in 20-day-old embryos *in vitro* was sensitive to cycloheximide but insensitive to actinomycin D. The inhibition of hydrocortisone-evoked disaccharidase activity by the administration of an inhibitor of messenger RNA synthesis indicates that the hormonal action was mediated by an effect on messenger RNA synthesis. It appears that sucrose might act on the glycosylation of enzymes occurring in chick intestine at the 20-day stage.

1013 INFLUENCE OF THYROID ON THE DEVELOPMENT OF INTESTINAL HYDROLASES. (Spa.) Llorens, J. M. C. (Red Cross Hosp., Barcelona, Spain). *Rev. Iber. Endocrinol.* 23(135):276-287; 1976.

The activity and distribution in distinct intestinal segments of disaccharidases and the levels of thyroxine in the blood during the perinatal period were simultaneously investigated. Female Sprague-Dawley rats were mated, and their litters were reduced to eight pups per mother at birth. On designated days after birth, the pups were decapitated, exsanguinated, and the serum tested for thyroxine; their intestines were removed and cut into portions 2-10 cm away from the pylorus. The distribution of the different disaccharidases was homogeneous throughout the intestinal segments tested. Values for sucrase and maltase increased, whereas lactase levels decreased with increasing age of the animals. Maltase values were 55.8 ± 21 U/g at 1-5 days, 31 ± 21 U/g at 9-13 days, and 135 ± 50 U/g at 13-33 days. Lactase levels at the same age intervals were 66 ± 18.8 U/g, 28 ± 21.4 U/g, and 10.2 ± 12.9 U/g, resp. On the other hand, the thyroxine levels were practically undetectable at birth (<0.05 μg/100 ml) and rapidly increased to the adult value (3.8 μg/100 ml) at 22 days after birth. It is concluded that the thyroid gland plays an important role in the intestinal maturation of rats.

1014 LIPOLYTIC ACTIVITIES AGAINST TRIOCTANOIN AND MONOOLEIN IN RAT INTESTINAL MUCOSA. (Eng.) Negrel, R.; Serrero, G.; Ailhaud, G. (Centre de Biochimie, Parc Valrose, 06034 Nice, France). *Biochimie* 59(4):433-438; 1977.

The hydrolysis of trioctanoin and of monoolein by rat intestinal homogenates, catalyzed by the previously described "trioctanoin hydrolase" and "monoglyceride lipase," was studied. The hydrolysis rate of trioctanoin catalyzed by homogeneous intestinal glycerol-ester hydrolase was 0.1% of that of tributyrin, indicating that this enzyme does not account for all the activity observed against trioctanoin (0.17 U/mg against a calculated value of 0.005 U/mg) in the homogenate. Treatment with 0.1 mM diisopropyl phosphofluoridate, a glycerol-ester hydrolase inhibitor, caused no inhibition of triolein hydrolysis and some inhibition of trioctanoin hydrolysis. Tributyrin and dioctanoin hydrolysis was inhibited incompletely, while *p*-nitrophenylacetate hydrolysis was completely inhibited by diisopropylphosphofluoridate. Pancreatic lipase is known to remain fully active after diisopropylphosphofluoridate treatment;

tributyrin, trioctanoin, and dioctanoin are hydrolyzed by both glycerol-ester hydrolase and pancreatic lipase, while *p*-nitrophenylacetate and triolein are only cleaved by glycerol-ester hydrolase and by lipase, resp. It is therefore concluded that contaminating pancreatic lipase, together with glycerol-ester hydrolase, is responsible for trioctanoin and monoolein hydrolysis. Only 12% of the trioctanoin hydrolase activity was recovered at pH 7.5 in the supernatant fraction of the homogenate. Alkaline treatment of the resulting pellet lead to a 70% recovery of the activity measured with either trioctanoin or triolein as substrates. Diethylaminoethane (DEAE)-cellulose chromatography at pH 7.5 showed that all octanoin hydrolase and triolein hydrolase activity was eluted with the breakthrough volume, whereas 90% of the tributyrin hydrolase activity was retained. Immunoprecipitation studies showed complete precipitation of the activity measured against tributyrin and trioctanoin as substrates. Identical equivalence points were found with the pH 8.5 supernatant, the cationic fraction, and the homogeneous rat pancreatic lipase using immunoserum against rat pancreatic juice. The results support the conclusion that trioctanoin and monoolein hydrolyses are due entirely to the action of intestinal glycerol-ester hydrolase and to contaminating pancreatic lipase bound to the intestinal cells.

1015 CHARACTERISTICS AND POSTNATAL DEVELOPMENT OF THE ACID LIPASE ACTIVITY OF THE RAT SMALL INTESTINE.

(Eng.) Coates, P. M.; Brown, S. A.; Jumawan, J.; Koldovsky, O. (Children's Hosp. Philadelphia, Philadelphia, PA 19104). *Biochem. J.* 166(3):331-338; 1977.

For the first time, acid lipase was identified in the rat small intestine by using esters of 4-methylumbelliferone as substrates; its biochemical characteristics and changes in its activity in various sections of the small intestine during early postnatal development are described. Maximum activity towards the oleate ester was found at pH 4.0. In adult animals, the activity of acid lipase exhibited both latency and sedimentability, indicating a lysosomal localization. The activity of acid lipase was practically the same along the height of the villus, thus paralleling the distribution of acid β-galactosidase. In adult rats, the activity of acid lipase in proximal jejunum and mid-jejunum sections of the small intestine was practically the same and exceeded the activity in the ileum by a factor of 2. In suckling rats, the activity of the enzyme in the mid-jejunum exceeded that in the proximal jejunum and ileum by 2.5- and 1.5-fold, resp. During postnatal development, the acid lipase activity of the mid-jejunum showed a peak between days 10 and 15, at which time it exceeded the adult mid-jejunum activity by five- to sixfold. The results of the pH-dependency experiments, studies of the distribution of the enzyme activities, and latency studies suggest the presence of more than one lipolytic activity hydrolyzing esters of 4-methylumbelliferone.

1016 METABOLISM AND TRANSPORT OF GLUTAMINE AND GLUCOSE IN VASCULARLY PERFUSED SMALL INTESTINE RAT [sic].

(Eng.) Hanson, P. J.; Parsons, D. S. (Dept. Biochemistry, Univ. Oxford, South Parks Rd., Oxford OX1 3QU, England). *Biochem. J.* 166(3): 509-519; 1977.

The metabolism and transport of glutamine and glucose were investigated in a preparation of rat small intestine perfused through the vascular bed *in vitro* and *in situ*. With glucose (7.5 mM) or glutamine (4.5 mM) in the lumen, approximately 40% of the substrate taken up appeared to be unchanged on the vascular side. When glutamine (1.5 mM) was also added to the vascular perfusate, glutamine metabolism was increased, and glutamine was taken up from both the vascular bed and lumen. When glutamine was presented to the tissue from the lumen, there was greater conversion into alanine, and when glucose was presented to the intestine from the lumen, there was greater conversion into lactate. Deprivation of food and metabolic acidosis had no effect upon glutamine utilization by unit length of jejunum. In fed rats, glutamine utilization was 44% of glucose utilization, but in rats deprived of food, it was 112% of glucose utilization. Glucose utilization and lactate production were not significantly altered by the presence of glutamine in the vascular bed or lumen. With glucose only in the vascular perfusate, glucose utilization was the same in jejunum and ileum. Glutamine metabolism in the ileum was 28% lower than in the jejunum. Glutamine utilization was dependent on the concentration of glutamine in the vascular perfusate, but was not significantly affected by the absence of glucose.

1017 BIOSYNTHESIS OF BRUSH BORDER GLYCOPROTEINS BY HUMAN SMALL INTESTINAL MUCOSA IN ORGAN CULTURE.

(Eng.) Hauri, H. P.; Kedinger, M.; Haffen, K.; Freiburghaus, A.; Grenier, J. F.; Hadorn, B. (Dept. Pediatrics, Univ. Bern, Freiburgstr. 23, CH-3010 Bern, Switzerland). *Biochim. Biophys. Acta* 467(3):327-339; 1977.

The synthesis of brush border glycoproteins by human small intestinal mucosa from patients with morbid obesity was studied in organ culture by measuring the incorporation of ^{14}C-glucosamine into brush border membranes and the release of labeled proteins into the culture medium. Purified brush border membrane proteins were analyzed on polyacrylamide-sodium dodecyl sulfate gels. Nonsoluble proteins from the culture media were isolated for analysis by ultracentrifugation. Total ^{14}C-glucosamine (5 μCi/ml) incorporation into glycoproteins was measured by long-term and pulse labeling; incorporation into brush border proteins by culturing explants in the presence of ^{14}C-glucosamine (10 or 20 μCi/ml) and periodically harvesting specimens for analysis. There were no significant differences between the protein patterns after gel electrophoresis of cultured and noncultured explants. Radioactivity present in the tissue plus medium increased linearly over a period of 48 hr. Between 24 and 48 hr, the rate of incorporation into tissue leveled off, but release of labeled proteins into the medium increased. After 5 hr, label incorporation into isolated brush border membranes was found in peaks comigrating with markers of maltase-glucoamylase, lactase, sucrase-maltase, and enterokinase plus one unidentified peak. After 24 hr, a peak comigrating with alkaline phosphatase activity appeared as well as two more unidentified peaks. Incorporation of label into the nonsoluble fraction of the media revealed similar protein patterns. These results indicated that the brush border membrane remains functionally stable in organ culture, providing a useful system for studying the biosynthesis and molecular nature of glycoproteins produced by patients with congenital brush border enzyme deficiencies.

1018 PLASMA SECRETIN CONCENTRATION IN ANAESTHETIZED PIGS AFTER INTRADUODENAL GLUCOSE, FAT, AMINOACIDS, OR MEALS WITH VARIOUS pH. (Eng.)

Fahrenkrug, J.; Schaffalitzky de Muckadell, O. B.; Holst, J. J. (Dept. Clinical Chemistry, Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(3):273-279; 1977.

The concentration of immunoreactive secretin in portal blood and the secretion from the exocrine pancreas were measured during intraduodenal infusion of glucose, fat, amino acids, or meals with various pH in seven anesthetized Danish Landrace pigs. The solutions (50 ml each) were warmed to 37 C and infused for 1 min each in the following order after a 15-min basal period: 0.9% NaCl, 5.5% glucose, isotonic fat emulsion, isotonic amino acids, 0.1 M HCl, 9.0% NaCl, and 50% glucose. All solutions except HCl were adjusted to pH 7.0. The duodenum was drained 15 min after an infusion and the next test solution was infused 15 min after the draining (30 min after HCl). In another experiment, test meals composed of 1.5 g protein, 1.2 g fat, and 0.4 g carbohydrate was infused at several pH's (7.0, 5.0, 4.0, 3.0, 2.0, and 1.0) into the duodenum of four pigs. The levels of immunoreactive secretin in portal blood were not affected by any of the solutions except HCl, which caused the mean plasma secretin level to increase from 5.6 ± 2.7 to 201.2 ± 80.5 pM in 15 min. HCl increased the mean pancreatic flow rate from 0.51 ± 0.19 to 9.85 ± 2.33 ml/hr and the bicarbonate output from 52 ± 11 to 1,004 ± 290 μmol/hr. All solutions, except those of NaCl increased protein output significantly, and hypertonic glucose and HCl significantly increased amylase levels. The plasma secretin level was significantly increased only by the test meal at pH 1.0 (from 5.5 ± 2.8 to 115.0 ± 51.2 pM after 15 min). Pancreatic flow increased from 0.20 ± 0.08 to 6.25 ± 2.57 ml/hr. Amylase levels were increased after all meals. Several inconsistencies with the results of previous studies are discussed, as well as the possibilities that the amount of acid infused with each meal might have been too low and that anesthesia may have influenced the amount of pancreatic secretion. It is concluded that the physiological role of secretin could not be clearly defined by this study.

1019 LACK OF HEPATIC INACTIVATION OF CANINE VASOACTIVE INTESTINAL PEPTIDE. (Eng.)

Strunz, U. T.; Walsh, J. H.; Bloom, S. R.; Thompson, M. R.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 73(4):768-771; 1977.

Hepatic inactivation of vasoactive intestinal peptide (VIP) was studied in conscious dogs. In three animals with gastric fistula, the portal vein and inferior vena cava were transposed, thus allowing access to the portal vein through a hind leg vein. To demonstrate that the liver's ability to inactivate peptides was intact in these dogs, each experiment with VIP was preceded by an intraportal pentagastrin infusion (4 μg/kg/hr), which failed to stimulate acid secretion. In the tests with VIP, a plateau of acid secretion was established by systemic i.v. infusion of pentagastrin (1 μg/kg/hr). While continuing infusion of pentagastrin, VIP (0.5, 1.0, or 2.0 μg/kg/hr) was given by portal or systemic infusion for 30 min. VIP produced a dose-dependent decrease in acid secretion ranging from about 30% inhibition with the low dose to about 60% inhibition with the high dose. The degree of inhibition produced by portal infusion of VIP did not differ significantly from that produced by systemic infusion. After infusion of 30 μg/kg/hr of VIP for 5 min, peak serum VIP levels by radioimmunoassay were 769 ± 63 pM after systemic and 717 ± 60 pM after portal administration, an insignificant difference. After stopping the infusion, the disappearance half-time of VIP was 3.1 ± 0.3 min, which did not differ significantly with the two routes of administration. It is concluded that inhibition of acid secretion and serum levels of VIP were not significantly different after portal or systemic infusions of VIP. Thus, no evidence of selective hepatic inactivation of VIP was found in dogs.

1020 RELEASE OF VASOACTIVE INTESTINAL POLYPEPTIDE (VIP) BY INTRADUODENAL STIMULI [Abstract]. (Eng.)

Schaffalitzky de Muckadell, O. B.; Fahrenkrug, J.; Holst, J. J. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):89; 1977.

1021 IONIC REQUIREMENTS FOR CAERULEIN-STIMULATED RELEASE OF ACETYLCHOLINE FROM MYENTERIC PLEXUS OF SMALL INTESTINE [Abstract]. (Eng.)

Yau, W. M.; Nemeth, P. R. (Sch. Medicine, Southern Illinois Univ., Carbondale, IL 62901). *Physiologist* 20(4):103; 1977.

1022 THE EFFECT OF ATROPINE ON SECRETIN RELEASE AND PANCREATIC BICARBONATE SECRETION AFTER DUODENAL ACIDIFICATION IN MAN [Abstract]. (Eng.)

Hanssen, L. E. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):32; 1977.

1023 REDUCTION OF BILE ACID- AND FATTY ACID-INDUCED INTESTINAL SECRETION BY PROPRANOLOL AND METHYLPREDNISOLONE [Abstract]. (Eng.)

Feinstein, J. D.; Bonorris, G. G.; Chung, A.; Coyne,

M. J.; Schoenfield, L. J. (Cedars Sinai Hosp., Los Angeles, CA). *Clin. Res.* 25(4):607A; 1977.

1024 HALF-LIFE, CLEARANCE, AND ENDOGENOUS SECRETION RATES OF CHOLECYSTOKININ-PANCREOZYMIN IN MAN [Abstract]. (Eng.) Harvey, R. F.; Oliver, J. M.; Read, A. E.; Ederle, A.; Vantini, I.; Scuro, L. A.; *et al.* (Frenchay Hosp., Bristol, England). *Gut* 18(11):A982; 1977.

1025 RISE OF SECRETIN AFTER ORAL FEEDING [Abstract]. (Eng.) Greenberg, G. R.; Hacki, W.; Domschke, W.; Domschke, S.; Mitznegg, P.; Demling, L.; Bloom, S. R. (Hammersmith Hosp., London, England). *Gut* 18(11):A981; 1977.

1026 INHIBITION OF CYCLIC AMP PRODUCTION IN ISOLATED COLON CELLS BY SOMATOSTATIN [Abstract]. (Eng.) Carter, R. F.; Bitar, K. N.; Zfass, A. M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA). *Clin. Res.* 25(4):570A; 1977.

1027 POSTPRANDIAL DUODENAL FUNCTION IN MAN [Abstract]. (Eng.) Miller, L. J.; Malagelada, J. R.; Go, V. L. W. (Mayo Clinic, Rochester, MN). *Clin. Res.* 25(4):573A; 1977.

1028 VASOACTIVE INTESTINAL PEPTIDE (VIP): QUANTIFICATION IN THE MAJOR COMPONENTS OF THE HAMSTER INTESTINE [Abstract]. (Eng.) O'Dorisio, T. M.; Mekhjian, H. S.; Gaginella, T. S. (Dept. Medicine, Ohio State Univ., Columbus, OH). *Clin. Res.* 25(4):573A; 1977.

1029 POSSIBLE DUAL ROLE FOR VASOACTIVE INTESTINAL PEPTIDE AS GASTROINTESTINAL HORMONE AND NEUROTRANSMITTER SUBSTANCE. (Eng.) Bryant, M. G.; Bloom, S. R.; Polak, J. M.; *et al.* (Hammersmith Hosp., London, England). *Lancet* 1(7967):991-993; 1976.

1030 DEVELOPMENT OF BILE ACID TRANSPORT IN HUMAN INTESTINE [Abstract]. (Eng.) Vaupshas, V.; Vitullo, B. B.; Mackie, G.; Shaffer, E.; de Belle, R. C. (Dept. Pediatrics, McGill Univ., Montreal, Canada). *Gastroenterology* 73(5):1252; 1977.

1031 UREA, URIC ACID, AND CREATININE FLUXES THROUGH THE SMALL INTESTINE OF MAN [Abstract]. (Eng.) Chadwick, V. S.; Jones, J. D.; Debongnie, J. C.; Gaginella, T.; Phillips, S. F. (Mayo Clinic, Rochester, MN 55901). *Gut* 18(11): A944; 1977.

1032 RELEASE OF VIP BY DUODENAL ACIDIFICATION IN MAN [Abstract]. (Eng.) Bloom, S. R.; Mitchell, S. J.; Greenberg, G. R.; Christofides, N.; Domschke, W.; Domschke, S.; *et al.* (Hammersmith Hosp., London, England). *Gut* 18(11):A963; 1977.

1033 CORRELATION BETWEEN THE SUCRASE ACTIVITY IN VITRO AND THE RATES OF DIGESTION AND ABSORPTION OF SUCPOSE IN VIVO IN RAT SMALL INTESTINE. (Jpn.) Murakami, E.; Saito, M.; Suda, M. (Sch. Medicine, Ehime Univ., Shigenobu, Ehime, Japan). *J. Jpn. Soc. Food Nutr.* 30(1):1-5; 1977.

1034 THE BIOCHEMICAL HETEROGENEITY OF MITOCHONDRIA FROM MUCOSA OF RAT SMALL INTESTINE. (Rus.) Adrianov, N. V.; Spirichev, V. B.; Shuppe, N. G. (Inst. Nutrition, Acad. Medical Science USSR, Moscow, USSR). *Vopr. Med. Khim.* 23(3): 398-403; 1977.

See also, 0778, 0779, 0780, 0781, 0788, 0789, 0799, 0800, 0803, 0814, 0834, 0856, 0888, 0898, 0914, 0999, 1038, 1039, 1041, 1044, 1053, 1054, 1059, 1069, 1074, 1081, 1216, 1266, 1353, 1623, 1637, 1638, 1661.

GENERAL

1035 THE MECHANISM OF LINCOMYCIN-INDUCED DIARRHOEA. (Eng.) Hoff, S. G.; Schjonsby, H.; Andersen, K. J. (Univ. Clinic, Bergen, Norway). *Acta Med. Scand. (Suppl.)* 603:35-38; 1977.

To determine whether lincomycin-induced diarrhea is caused by bile acid malabsorption, metabolic studies were performed before and 7 days after treating rats p.o. with lincomycin (1 mg/ml drinking water). Following the treatment the mean fecal weight increased from 30.2 ± 3.8 g/72 hr to 65.5 ± 8.2 g/72 hr. The fecal fat excretion was unchanged, and the weight increase was mainly due to increased water content. The absorption rate of ^{14}C-taurocholic acid was measured in untreated rats and rats treated with lincomycin, using an *in vivo* perfusion technique. There was no significant difference in bile acid absorption rate measured at three different concentrations of bile acid (0.125, 0.500, 1.500 mM) in the perfusate. Although these results apparently exclude the hypothesis that lincomycin-induced diarrhea is caused by bile acid malabsorption, a back-wash ileitis might be present in this type of diarrhea and could explain bile acid malabsorption as a secondary phenomenon.

1036 PROTEIN-ENERGY MALNUTRITION IN INFANT NON-HUMAN PRIMATES (Macaca nemestrina). I.

CORRELATION OF BIOCHEMICAL CHANGES WITH FINE STRUCTURAL ALTERATIONS IN THE LIVER.

(Eng.) Enwonwu, C. O.; Worthington, B. S.; Jacobson, K. L. (Center for Res. Oral Biology, Univ. Washington, Seattle, WA). *Br. J. Exp. Pathol.* 58(1):78-94; 1977.

Possible correlations between biochemical changes and fine structural alterations were investigated in the livers of malnourished infant monkeys. Male infant pigtail monkeys *(Macaca nemestrina)* aged 6-9 months and born in captivity were fed a restricted amount of either an adequate protein diet (20% casein) or a protein-deficient diet (2% casein). After 3-5 months of receiving the low protein-containing diet, ultrastructural evaluation of hepatic parenchymal cells revealed extensive fatty metamorphosis, marked fragmentation and vesiculation of the rough endoplasmic reticulum, some evidence of distention of the nuclear membrane, a variable degree of mitochondrial polymorphism and gigantism, increased intracytoplasmic accumulation of glycogen particles, and enhanced prominence of collagen fibers in the intercellular and perisinusoidal spaces. Biochemical studies indicated severe distortion in the plasma profile of free amino acids by week 10 of malnutrition, with a prominent decrease in valine/glycine ratio (9% in the malnourished animals compared to a ratio of 55-63% in the control group). While plasma concentration of glycine was elevated above baseline value throughout the period of malnutrition, the level of alanine showed an initial rise followed by a significant drop (-58% at week 20). Although showing wide individual variation, the plasma level of corticosteroid in general tended to increase with duration of protein malnutrition, an observation consistent with the accumulation of glycogen and enlargement of mitochondria in the hepatic cells.

1037 DECREASED CONJUGATION OF *p*-AMINOBENZOIC ACID IN THE ICTERIC NEW BORN GUNN RAT.

(Eng.) Davis, D. R.; Yeary, R. A. (Dept. Veterinary Physiology, Ohio State Univ., Columbus, OH 43210). *Biochem. Pharmacol.* 26(6):535-539; 1977.

The metabolism of *p*-aminobenzoic acid in the icteric and nonicteric Gunn rat was studied. The urinary metabolites of *p*-aminobenzoic acid identified were the parent compound, *p*-aminohippuric acid, and *p*-aminobenzoic acid glucuronide. The icteric Gunn rat excreted significantly less *p*-aminobenzoic acid within 24 hr and also excreted significantly less of the compound as the glucuronide. In the newborn icteric rat, the major excretory product was the unchanged *p*-aminobenzoic acid, whereas in the adult most of the drug was excreted as the glycine conjugate. The data *in vivo* and *in vitro* indicated that the icteric newborn rat converts significantly less *p*-aminobenzoic acid to *p*-aminohippuric acid than does the nonicteric rat. The synthesis of *p*-aminohippuric acid was low in both genotypes at birth, but rapidly approached adult levels at 30 days of age. The increased toxicity of *p*-aminobenzoic acid in the 2-day-old icteric Gunn rat may be the result of a decreased *p*-aminobenzoic acid metabolism in these rats due to a deficiency in the activity of the enzyme uridine diphosphate-glucuronyltransferase and possibly glycine-*N*-acyltransferase.

1038 ANGIOGRAPHIC ASPECTS OF EXPERIMENTAL NONOCCLUSIVE INTESTINAL ISCHEMIC INJURY.

(Eng.) Bookstein, J. J.; Goldberger, L.; Niwayama, G.; Naderi, M. J.; Brahme, F. J.; Jones, T. A. (Univ. California Medical Center, 225 West Dickinson St., San Diego, CA 92103). *Am. J. Roentgenol.* 128(6):923-930; 1977.

Hypovolemic and normovolemic hypotensive models for nonocclusive ischemic injury were developed in mongrel dogs to investigate the accuracy of angiography in diagnosing the presence and extent of ischemic injury and to evaluate the therapeutic, prophylactic, or diagnostic values of papaverine as a vasodilator. Drugs, anesthesia, and contrast medium for angiography were administered through i.v. and intra-arterial (i.a.), catheters. In the hypovolemic model, nine dogs were bled into a reservoir through a catheter passed into the left femoral artery and blood pressure held at 40, 50 or 60 mm Hg for varying time intervals. The peritoneum and intestines were examined after sacrifice at 48 or 72 hr, or at spontaneous death. Normovolemic hypotension was studied in a similar model by injecting isotonic saline into the pericardial sac to reduce the blood pressure to 40 or 50 mm Hg for varying time intervals. Following the shock period, the pericardial fluid was withdrawn and blood pressure normalized. The hearts and intestines were examined either at sacrifice (24 hr) or at spontaneous death. Papaverine infusion (0.5 mg/min) into the superior mesenteric artery was begun at various intervals after the onset of shock and continued throughout the shock period in six dogs with normovolemic shock. Papaverine infusion (0.15 mg/ml, 0.033-0.075 mg/min) into a segmental ileac branch was begun with the onset of normovolemic shock and continued for 30-45 min (2 dogs) or for 2 hr (3 dogs). Arteriograms of the superior mesenteric artery were performed at regular intervals in 9 dogs with hypovolemic hypotension and in 17 dogs with normovolemic hypotension (with and without papaverine). Four of nine dogs died 1.5 to 4.5 hr after the onset of hypovolemic hypotension; ischemic injuries to the small bowel occurred in eight dogs, while the colon was affected in only one dog. On a scale of 0-4, the mean severity of the injuries was 1.67 ± 0.9, and was not affected by the amount and duration of hypotension. Six of 13 dogs died 1-3.5 hr after the onset of normovolemic shock; small bowel and colonic injury were more severe (3.5 ± 0.58) than in hypovolemic hypotension. Normovolemic hypotensive animals given papaverine survived until sacrifice (48 or 72 hr); the mean grade of injury in the 6 dogs receiving papaverine via the superior mesenteric artery was 0.92 ± 0.92, whereas it was 3.31 ± 0.59 in 12 normovolemic hypotensive dogs not given papaverine. Angiography and the post-papaverine vasodilator response did not reflect the nature or extent of injury in either the hypovolemic or normovolemic shock models. However, papaverine administered within 2 hr after the onset of normovolemic shock greatly reduced intestinal injury.

1039 THE EFFECT OF DIGITALIS ON REGIONAL ISCHAEMIA OF THE RAT SMALL INTESTINE.

(Eng.) Rentzhog, L.; Wikstrom, S. (Univ. Hosp., Uppsala, Sweden). *Upsala J. Med. Sci.* 81(3):179-182; 1976.

Digitoxin was administered to male Sprague-Dawley rats (in which iodine metabolism had been standardized) with induced regional intestinal ischemia to examine its effect on collateral circulation in the small bowel. Exchange circulation was analyzed 30 min after the transmural injection of a test dose of ^{131}INa into the lumen of the isolated intestinal loop. In one experiment, digitoxin (0.1 mg/100 g body weight, i.v.) was administered to 20 rats, and ischemia comprising 11 mesenteric end arcades was established 2 hr after the digitoxin was administered. The exchange circulation was examined 30 min later. The rats retained 50% of the radioactivity in the intestinal loop; whereas untreated ischemic animals and animals without ischemia retained 63 and 25%, resp. The results demonstrate that digitalis disrupts the collateral circulation in adjacent healthy intestine as well as in the small vessels in the intestinal loop. In another experiment, an ischemia comprising seven mesenteric end arcades was induced in 22 rats, followed by administration of digitoxin (0.1 mg/100 g, s.c. daily for 2 wk). The exchange circulation was then analyzed. Four of the treated rats died. After 2 weeks, the weight of rats treated with digitoxin had not changed, whereas untreated ischemic rats had increased their weight by 10%. The treated and untreated groups retained 42 and 37% of the radioactivity in the loop, resp. Disruption of collateral circulation was not observed in this test group, but the increased mortality and the absence of weight increase suggest that prolonged treatment with digitalis may have toxic effects.

1040 CLINDAMYCIN-ASSOCIATED COLITIS IN HAMSTERS: PROTECTION WITH VANCOMYCIN. (Eng.)

Bartlett, J. G.; Onderdonk, A. B.; Cisneros, R. L. (Veterans Admin. Hosp., 150 S. Huntington Ave., Boston, MA 02130). *Gastroenterology* 73(4):772-776; 1977.

The possible protective effects of gentamicin, vancomycin, and bacitracin on clindamycin- or lincomycin-induced colitis were investigated in male Syrian hamsters. The animals received lincomycin hydrochloride (2 mg/day, i.m.) or clindamycin phosphate (2 mg/day i.m. or i.p. or 0.1 ml/day, p.o.) for 3 days. Some animals received clindamycin intracecally (5 mg) at laparotomy. Clindamycin or lincomycin was fatal to 65 of 67 recipients during the 2-week observation period. The p.o. administration of gentamicin (2 mg/ml drinking water for 14 days starting 48 hr before initiating lincomycin or clindamycin treatment) prevented mortality in 7 of 11 animals challenged with lincomycin and 5 of 10 animals challenged with clindamycin. The best protective results were achieved with vancomycin and bacitracin. Bacitracin (3 mg/ml drinking water) prevented death in all 10 animals challenged with clindamycin. The simultaneous administration of vancomycin (3 mg/ml) with gentamicin (2 mg/ml) prevented death in all 10 animals challenged with clindamycin and all 9 animals challenged with lincomycin. The administration of vancomycin alone (3 mg/ml, p.o. or 10 mg/day, i.m.) for 14 days prevented death in all 30 animals that received clindamycin. There was no gross or microscopic evidence of intestinal lesions in the animals treated with vancomycin. Clindamycin administration resulted in minimal changes in total aerobic and anaerobic counts, although there was more than a 4-log increase in mean concentrations of coliforms. Vancomycin produced a similar increase in coliform concentrations and a marked decrease in clostridia counts, whereas no change was detected after clindamycin administration. The results demonstrate that vancomycin protects against a lesion in hamsters in which coliform bacteria would be the anticipated pathogens.

1041 ENTERIC FLORA OF NORMAL LABORATORY GUINEA-PIGS.

(Eng.) McLean, A. J.; Boquest, A. (Univ. Texas Health Science Center, San Antonio, TX 78284). *Br. J. Exp. Pathol.* 58(3):251-254; 1977.

The bowel flora of guinea pigs was studied using nonselective cultural conditions and conditions highly selective for *Escherichia coli* organisms. No *E. coli* were cultured from adult or juvenile bowel content. Parallel studies showed that culture media supported the growth of small numbers of reference *E. coli* "seeded" into them along with bowel content. It is concluded that normal adult laboratory guinea pigs may be bacteriologically equivalent to the NCS strain of "*E. coli*-free" mice, and it appears, therefore, to represent an experimental model for the study of endotoxin toxicity mechanisms.

1042 ROLE OF COLONIC BACTERIA IN THE PATHOPHYSIOLOGY OF FECAL PERITONITIS. (Eng.)

Rink, R. D.; Short, B. L.; Van, N. V.; Fry, D. E. (Univ. Louisville Health Sciences Center, Louisville, KY 40201). *Circ. Shock* 4(3):259-270; 1977.

The role of colonic bacteria in the reactions accompanying fecal peritonitis was investigated in male Sprague-Dawley rats. Septic or nonseptic peritonitis was induced by the administration through an abdominal incision of fresh fecal suspensions or suspensions pretreated with heat or antibiotic. Measurements during 8 hr in rats with septic peritonitis recorded bacteremia, hypoglycemia and progressive hemoconcentration, lactacidemia, and hypocapnea. Mortality was 100% by 24 hr. Nonseptic peritonitis produced significantly lesser degrees of hemoconcentration and hypocapnea. Plasma lactate remained in control ranges, while plasma glucose concentrations increased slightly. Mortality was 5% in 24 hr. The same parameters in control rats were stable over 8 hr. Hepatic oxygen supply was estimated in each group by multiple platinum wire electrodes. Severe hepatic hypoxia was recorded by 6 hr in rats with septic peritonitis (PO_2=3.0 mm Hg). By contrast, nonseptic peritonitis caused a comparatively mild degree of hypoxia (9.5-10.9 mm Hg) in comparison with that in controls (16.8 mm Hg). The pathophysiologic developments in septic rats appear to be largely the result of hypovolemia induced by colonic bacteria. The administration of a colloid solution (4% Ficol 70 in 0.9% saline) was effective in preventing its development.

1043 EFFECT OF NEONATAL GASTROINTESTINAL COLONIZATION WITH CROSS-REACTING Escherichia coli ON ANTICAPSULAR ANTIBODY PRODUCTION AND BACTEREMIA IN EXPERIMENTAL Haemophilus influenzae TYPE b DISEASE OF RATS. (Eng.) Myerowitz, R. K.; Norden, C. W. (Presbyterian-Univ. Hosp., Pittsburg, PA 15213). *Infect. Immun.* 17(1):83-90; 1977.

Experiments were carried out to determine whether neonatal gastrointestinal colonization by cross-reacting *Escherichia coli* induces protection against experimental *Haemophilus influenzae* type b (HIb) infection. Neonatal gastrointestinal colonization of newborn rats with *E. coli* 075:K100:H5, cross-reactive with the capsular polysaccharide of HIb, was harmless but failed to stimulate detectable (>200 ng/ml) serum anticapsular antibodies. Neonatally colonized rats, when challenged at age 13 weeks by i.p. inoculation of HIb, showed no difference in the frequency, magnitude, or duration of bacteremia or in the postinfection anticapsular antibody response when compared with saline-fed controls. However, neonatally colonized rats challenged at age 4 weeks had a significantly decreased incidence of sustained bacteremia and/or endophthalmitis when compared with controls. This decreased frequency of disease correlated with a significant increase in postinfection serum anticapsular antibodies. Neonatal gastrointestinal colonization with cross-reacting *E. coli* appears to "prime" the young host to respond to infection with HIb with an anticapsular antibody response that protects against sustained HIb bacteremia and its complications.

1044 THYMUS DEPENDENCE AND INDEPENDENCE OF INTESTINAL PATHOLOGY IN A Trichinella spiralis INFECTION: A STUDY IN CONGENITALLY ATHYMIC (NUDE) MICE. (Eng.) Ruitenberg, E. J.; Leenstra, F.; Elgersma, A. (Natl. Inst. Public Health, P.O. Box 1, Bilthoven, Netherlands). *Br. J. Exp. Pathol.* 58(3):311-314; 1977.

The hypothesis that nonspecific histopathological gut changes are thymus-dependent was tested in a *Trichinella spiralis* infection. The study was performed in congenitally athymic (*nu/nu*) mice and their thymus-bearing heterozygous litter mates (+/*nu*). The nonspecific histopathological changes of the small intestine were judged on villus/crypt ratio and mitotic index; for the specific (immunological) reaction the number of pyroninophilic cells in the small intestine was used as criterion. *T. spiralis* induced nonspecific histopathological reactions both in *nu/nu* and +/*nu* mice, whereas the number of pyroninophilic cells was only increased in +/*nu* mice. It is concluded that the immunological reaction was dependent on the immune status of the host, whereas the nonspecific histopathological changes were not (i.e., they were thymus-independent)

1045 EARLY LESIONS OF PANCREATIC DUCTAL CARCINOMA IN THE HAMSTER MODEL. (Eng.) Pour, P.; Althoff, J.; Takahashi, M. (Eppley Inst. for Res. in Cancer, 42nd and Dewey Ave., Omaha, NB 68105). *Am. J. Pathol.* 88(2):291-303; 1977.

The site of pancreatic ductal carcinoma origin was investigated by analyzing the sequence of events in pancreatic carcinogenesis in a hamster model. Syrian golden hamsters were treated s.c. weekly with *N*-nitrosobis(2-oxopropyl)amine (10 mg/kg) for life (group 1) or 6 weeks and were sacrificed at biweekly intervals from 2 weeks (group 1) and 8 weeks (group 2) after initiation of the experiment. The pancreas was examined in step sections, and the sequential alterations noted for each interval were recorded. Lesions were found in intrapancreatic and extrapancreatic ducts. Equivalent alterations consisting of hyperplasia, metaplasia, atypia, and lesions characteristic of carcinoma *in situ* developed ubiquitously and simultaneously in pancreatic ducts of different sizes and in ductules, but not in acinar cells. Among the most significant findings were intrainsular ductular formations, their proliferation, and sequential malignant alteration comparable to the involved pre-existing ductules. Differences between the two experimental groups were of a quantitative rather than qualitative nature. The results indicate a common origin of all induced tumors from a pluripotent cell populating the pancreatic ductal system.

1046 HYPEROSMOLALITY AND PANCREATIC BLOOD FLOW. (Eng.) Jarhult, J.; Thulin, A. (Dept. Physiology, Univ. Lund, Solvegatan 19, S-22362 Lund, Sweden). *Pfluegers Arch.* 370(2):127-130; 1977.

The possible role of regional hyperosmolality in functional pancreatic hyperemia was studied in the cat pancreas. Close intra-arterial infusions of hypertonic xylose, glucose, and sucrose solution (30-50%) caused a marked vasodilatation but no secretion. The magnitude of the vasodilator response correlated with the degree of induced glandular hyperosmolality but not with the substance per se. The initial decrease of vascular resistance (peak response) averaged about 35% of the control value, whereas the steady-state response was 60-70% of the control value. Stimulation of the vagus nerve as well as infusion of secretin and/or cholecystokinin evoked a pronounced secretion and a small to moderate increase in pancreatic blood flow (peak increase 130-225% of control), but did not significantly change the plasma osmolality in the venous effluent from the gland. Bradykinin, papaverine, and isoproterenol caused large increments of pancreatic blood flow; none of these drugs evoked secretion, nor did they change the venous osmolality. It is concluded that blood-borne hyperosmolality is a strong stimulus for pancreatic vasodilatation, but the functional hyperemia of this gland is due to factors other than regional tissue hyperosmolality.

1047 SELF-REGULATION OF REGIONAL CIRCULATION IN THE PANCREAS. EFFECT OF PERIPHERAL VENOUS INTRAMURAL STIMULATION. 4. INFLUENCE OF ATROPINE. (Ita.) Musca, A.; Marigliano, V.; Cordova, C.; Cammarella, I. (VI Cattedra di Semeiotica Medica, Universita di Roma, Rome, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(16):1215-1218; 1976.

The influence of atropine on pressor valve response was studied in the pancreas of the dog. Percentage variation in pancreatic circulation was measured at 15-min intervals beginning at 30 min and continuing for 3 hr after i.v. administration of 30 μg/kg atropine sulfate. Peak variations from baseline values occurred between 30 min and 2 hr after treatment. Atropine sulfate is capable of interrupting pressor response at the point of expression of the vascular region of the pancreas but not in the intramural peripheral veins.

1048 SELF-REGULATION OF REGIONAL CIRCULATION IN THE PANCREAS. EFFECT OF PERIPHERAL VENOUS INTRAMURAL STIMULATION. 5. INFLUENCE OF SODIUM PENTOBARBITAL. (Ita.) Marigliano, V.; Musca, A.; Cordova, C.; Cammarella, I. (VI Cattedra di Semeiotica Medica, Universita di Roma, Rome, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(16):1219-1222; 1976.

The influence of sodium pentobarbital on pressor valve response was studied in the pancreas of the dog. Percentage variation in pancreatic circulation was measured at 15-min intervals beginning at 30 min and continuing for 3 hr after i.v. administration of 30 μg/kg sodium pentobarbital. Sodium pentobarbital interrupts pressor response at the point of expression of the vascular regions of the pancreas but not in the peripheral veins.

1049 EXPERIMENTAL STUDY OF THE SELF-REGULATION OF REGIONAL CIRCULATION IN THE PANCREAS. EFFECT OF PERIPHERAL VENOUS INTRAMURAL STIMULATION. 6. INFLUENCE OF HISTAMINE. (Ita.) Musca, A.; Marigliano, V.; Cordova, C.; Cammarella, I. (VI Cattedra di Semeiotica Medica, Universita di Roma, Rome, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(16): 1223-1228; 1976.

The influence of histamine on pressor valve response was studied in the pancreas of the dog. Percentage variation in pancreatic circulation was measured at 15-min intervals beginning at 30 min and continuing for 3 hr after i.v. administration of 30 μg/kg histamine. Histamine does not inhibit pressor response in the peripheral veins but rather intensifies it. Pancreatic circulation increases with time in a prolongation of the phenomenon after administration of the drug.

1050 PANETH CELLS IN EXPERIMENTAL AMYLOIDOSIS. (Eng.) Ahonen, A.; Penttila, O.; Klinge, E. (Dept. Pharmacology, Univ. Helsinki, Siltavuorenpenger 10 A, SF-00170 Helsinki 17, Finland). *Scand. J. Gastroenterol.* 12(2):129-133; 1977.

The effect of experimental amyloidosis on the morphology of mouse Paneth cells was investigated, using light and fluorescence microscopy. Amyloidosis was induced by daily s.c. casein injections (0.2 ml) for 4 weeks. The number of secretory granules of the Paneth cells increased in the jejunum ($p<0.001$), but remained normal in the duodenum. Small morphological alterations took place in the Paneth cells during the induction of amyloidosis, and occasionally the Paneth cells were totally lost. These changes suggest that the function of the Paneth cells of the jejunum may be partly inhibited during experimental amyloidosis.

1051 PURIFICATION OF HOG GASTRIC INTRINSIC FACTOR BY A SIMPLE TWO-STEP PROCEDURE BASED ON AFFINITY CHROMATOGRAPHY AND A SELECTIVE GUANIDINE HYDROCHLORIDE GRADIENT. (Eng.) Francis, G. L.; Smith, G. W.; Toskes, P. P.; Sanders, E. G. (Veterans Admin. Hosp., Gainesville, FL 32602). *Gastroenterology* 72(6):1304-1307; 1977.

A method for the separation of intrinsic factor (IF) from NIF (a vitamin B_{12}-binding glycoprotein not active in promoting vitamin B_{12} absorption) is described. Monocarboxylic acid derivatives of vitamin B_{12} were covalently coupled to 1,6-hexanediamine-substituted Sepharose by using a water-soluble carbodiimide resulting in 1.32 μmol of B_{12} coupled per ml of Sepharose. After a source of crude hog IF was passed over the column, a selective linear gradient of guanidine HCl (0-4.0 M) was used to remove IF and 4.0-7.5 M to elute NIF. Anti-IF antibodies blocked 99% of the B_{12} binding by the isolated IF and only 1% of the B_{12} binding by NIF. Passage over a hydroxyapatite column resulted in IF 99% pure with a specific activity of 29.8 μg of B_{12} binding per mg of protein. IF so isolated exhibited one homogeneous band on polyacrylamide gel electrophoresis and corrected B_{12} malabsorption in a patient with pernicious anemia.

1052 ANTHELMINTIC DIHYDROQUINOXALINO[2,3-b]-QUINOXALINES. (Eng.) Fisher, M. H.; Lusi, A.; Egerton, J. R. (Merck and Co., Inc., Rahway, NJ 07065). *J. Pharm. Sci.* 66(9):1349-1352; 1977.

1053 MORPHOLOGIC DEVELOPMENT OF THE HUMAN FETAL SMALL INTESTINE. (Eng.) Moxey, P. C. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at*

Proust's Neck, Maine, June 13-16, 1976. (Columbus: Ross Laboratories):19-23; 1977.

1054 CHANGES IN THE DIGESTIVE AND OTHER ORGANS OF PIGS IN THE PERINATAL PERIOD. (Eng.) Widdowson, E. M. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Proust's Neck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories):35-40; 1977.

1055 EPITHELIAL-MESENCHYMAL INTERACTIONS IN GASTROINTESTINAL ORGAN DEVELOPMENT. (Eng.) Bernfield, M. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatric Research held by the Harvard Medical School Department of Pediatrics at Proust's Neck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories):40-44; 1977.

1056 FUNCTIONAL ADAPTATION OF EXOCRINE GLANDS. (Eng.) Grand, R. J. *In: Gastrointestinal Development and Neonatal Nutrition. Report of the Seventy-second Ross Conference on Pediatrics Research held by the Harvard Medical School Department of Pediatrics at Proust's Neck, Maine, June 13-16, 1976.* (Columbus: Ross Laboratories):59-62; 1977.

1057 NON-STEROID ANTI-INFLAMMATORY DRUGS: COMBINED ASSAY FOR ANTI-EDEMIC POTENCY AND GASTRIC ULCEROGENESIS IN THE SAME ANIMAL. (Eng.) Rainsford, K. D.; Whitehouse, M. W. (Dept. Biochemistry, Univ. Tasmania, Hobart 7001, Australia). *Life Sci.* 21(3):371-377; 1977.

1058 EFFECTS OF ASPIRIN-LIKE DRUGS ON CANINE GASTRIC MUCOSAL BLOOD FLOW AND ACID SECRETION. (Eng.) Bennett, A.; Curwain, B. P. (King's Coll. Hosp. Medical Sch., London SE5 8RX, England). *Br. J. Pharmacol.* 60(4):499-504; 1977.

1059 THE ROLE OF TOPICALLY APPLIED DEXAMETHASONE IN PREVENTING PERITONEAL ADHESIONS: EXPERIMENTAL AND CLINICAL STUDIES. (Eng.) Shikata, J. I.; Yamaoka, I. (Teikyo Univ. Sch. Medicine, 2-11-1 Kaga, Itabashi, ku, Tokyo 173, Japan). *World J. Surg.* 1(3):389-395; 1977.

1060 BILE INDUCED CHRONIC GASTRIC ULCER IN SWINE. (Eng.) Rokkjaer, M.; Sogaard, H.; Kruse, A.; Amdrup, E. (Kommunehospitalet, DK-8000 Aarhus C, Denmark). *World J. Surg.* 1(3):371-379; 1977.

1061 SECRETORY IgA ANTIBODIES AGAINST COW'S MILK PROTEINS IN HUMAN MILK AND THEIR POSSIBLE EFFECT IN MIXED FEEDING. (Eng.) Hanson, L. A.; Ahlstedt, S.; Carlsson, B.; Fallstrom, S. P. (Inst. Medical Microbiology, Guldhedsgatan 10, S-413 46 Goteborg, Sweden). *Int. Arch. Allergy Appl. Immunol.* 54(5):457-462; 1977.

1062 MYOELECTRICAL ACTIVITY OF THE CANINE STOMACH AND DUODENUM AFTER GASTRIC RESECTION. (Eng.) O'Leary, J. F.; Hennessy, T. P. J. (Dept. Surgery, Univ. Coll., Cork, Ireland). *J. Surg. Res.* 23(3):161-165; 1977.

1063 DEPENDENCE OF HORMONAL EFFECTS FROM NUTRIENTS SUPPLY. (Eng.) Nesterin, M. F. (USSR Acad. Medical Sciences, Moscow, USSR). *Nutr. Metab.* 21(Suppl. 1):249-253; 1977.

1064 AGE-SPECIFIC DIFFERENTIATION DURING THE DEVELOPMENT OF THE RAT SUBMANDIBULAR GLAND. (Eng.) Denny, P. C.; Cope, P. (Ethel Percy Gerontology Center, Los Angeles, CA). *Differentiation* 8(2):105-111; 1977.

1065 COMPARATIVE DEVELOPMENTAL ASPECTS OF SELECTED ORGAN SYSTEMS. II. GASTROINTESTINAL AND UROGENITAL SYSTEMS. (Eng.) Hoar, R. M. (Hoffmann-La Roche Inc., Nutley, NJ 07110). *Environ. Health Perspect.* 1:61-66; 1976.

1066 NUTRITIONAL EFFECTS OF SALMONELLOSIS IN MICE. (Eng.) Moore, R. N.; Johnson, B. A.; Berry, L. J. (Dept. Microbiology, Univ. Texas, Austin, TX 78712). *Am. J. Clin. Nutr.* 30(8):1289-1293; 1977.

1067 INHIBITORY EFFECT OF SULPIRIDE ON CINCHOPHEN GASTRIC ULCERATION IN DOGS. (Eng.) Nagamachi, Y. (Gumma Univ. Sch. Medicine, 3-39-15, Showamachi, Maebashi 371, Japan). *Gastroenterol. Jpn.* 12(2):1-7; 1977.

1068 INFLUENCES OF ULCEROGENIC STIMULATIONS ON THE STOMACH WITH THE CLAMPING ULCERS IN RATS. (Eng.) Miyazawa, M. (Tokyo Medical Coll., 7-1 Nishi-Shinjuku, 6-chome, Shiujuku-ku, Tokyo 160, Japan). *Gastroenterol. Jpn.* 12(2):8-19; 1977.

1069 ACTIVITIES OF INTESTINAL ENZYMES IN EXPERIMENTAL CHRONIC RENAL INSUFFICIENCY. (Eng.) Grimmel, K.; Bongartz, S.; Kaspar, H. (Medizinische Universitatsklinik Wurzburg, D-8700 Wurzburg, W. Germany). *Nephron* 19(2):81-87; 1977.

1070 CARRAGEENAN IN FORMULA AND INFANT BABOON DEVELOPMENT. (Eng.) McGill, H. C., Jr.; McMahan, C. A.; Wigodsky, H. S.; Sprinz, H. (Univ. Texas Health Sciences Center, 7703 Floyd Curl Drive, San Antonio, TX 78284). *Gastroenterology* 73(3):512-517; 1977.

1071 THE EFFECTS OF VARIOUS FORMS OF GASTROINTESTINAL CANNULATION ON DIGESTIVE MEASUREMENTS IN SHEEP. (Eng.) MacRae, J. C.; Wilson, S. (Hill Farming Res. Organisation, Bush Estate, Penicuik, Midlothian EH26 OPY, England). *Br. J. Nutr.* 38(1):65-71; 1977.

1072 INTESTINAL LESIONS INDUCED IN GNOTOBIOTIC CALVES BY THE VIRUS OF HUMAN INFANTILE GASTROENTERITIS. (Eng.) Mebus, C. A.; Wyatt, R. G.; Kapikian, A. Z. (Dept. Veterinary Science, Univ. Nebraska, Lincoln, NB 68583). *Vet. Pathol.* 14(3): 273-282; 1977.

1073 Aeromonas hydrophila IN ACUTE DIARRHEAL DISEASE: DETECTION OF ENTEROTOXIN AND BIOTYPING OF STRAINS. (Eng.) Ljungh, A.; Popoff, M.; Wadstrom, T. (Karolinska sjukhuset, S-104 01 Stockholm 60, Sweden). *J. Clin. Microbiol.* 6(2): 96-100; 1977.

1074 BIOCHEMICAL CHANGES IN PRENEOPLASTIC RODENT INTESTINES. (Eng.) Ball, W. J., Jr.; Salser, J. S.; Balis, M. E. (Memorial Sloan Kettering Cancer Center, New York, NY 10021). *Cancer Res.* 36(7, Part II):2686-2689; 1976.

1075 PRODUCTION OF INTESTINAL AND OTHER TUMORS BY 1,2 DIMETHYLHYDRAZINE DIHYDROCHLORIDE IN MICE. I. A LIGHT AND TRANSMISSION ELECTRON MICROSCOPIC STUDY OF COLONIC NEOPLASMS [Abstract]. (Eng.) Toth, B.; Malick, L.; Shimizu, H. (Univ. Nebraska Medical Center, Omaha, NB 68105). *Am. J. Pathol.* 84(1):69-86; 1976.

1076 CARCINOGENS OCCURRING NATURALLY IN FOODS. (Eng.) Miller, J. A.; Miller, E. C. (Univ. Wisconsin Medical Center, Madison, WI 53706). *Fed. Proc.* 35(6):1316-1321; 1976.

1077 PORTAL PRESSURE REDUCTION INDUCED BY BALLOON OBSTRUCTION OF THE SUPERIOR MESENTERIC ARTERY (SMA) [Abstract]. (Eng.) Groszmann, R. J.; Blei, A. T.; Kniaz, J. L.; Storer, E. H.; Conn, H. O. (Veterans Admin. Hosp., West Haven, CT). *Gastroenterology* 73(5):1222; 1977.

1078 THE ROLE OF LIPIDS IN THE DIETARY REGULATION OF PLASMA BILIRUBIN CONCENTRATION [Br] IN GUNN RATS [Abstract]. (Eng.) Billing, B. H.; Hole, D. R.; Tickner, T. R.; Gollan, J. L. (Royal Free Hosp., London, England). *Gastroenterology* 73(5):1213; 1977.

1079 EFFECT OF THE HISTAMINE H2 ANTAGONIST CIMETIDINE ON GASTRIC MUCOSAL BLOOD FLOW [Abstract]. (Eng.) Knight, S. E.; McIsaac, R. L.; Fielding, L. P. (St. Mary's Hosp. Medical Sch., London, England). *Gut* 18(11):A948; 1977.

1080 MUCOSAL ADHERENCE OF HUMAN ENTEROPATHOGENIC E. coli (EPEC) IS MEDIATED BY A TRANSMISSIBLE PLASMID [Abstract]. (Eng.) McNeish, A. S.; Williams, P. H.; Evans, N.; Turner, P.; George, R. H. (Univ. Leicester, Leicester, England). *Gut* 18(11):A943; 1977.

1081 INFLUENCE OF METRONIDAZOLE AND NEOMYCIN ON COLONIC MICROFLORA IN HEALTHY VOLUNTEERS [Abstract]. (Eng.) Arabi, Y.; Dimock, F.; Burdon, D. W.; Alexander-Williams, J.; Keighley, M. R. B. (General Hosp., Birmingham, England). *Gut* 18(11):A969-A970; 1977.

See also, 0785, 0861, 0967, 1013, 1621.

DIAGNOSTIC PROCEDURES

1082 EMERGENCY DIAGNOSIS OF UPPER GASTROINTESTINAL BLEEDING BY FIBEROPTIC ENDOSCOPY. (Eng.) Villar, H. V.; Fender, H. R.; Watson, L. C.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *Ann. Surg.* 185(3):367-374; 1977.

Experience with 192 patients in whom emergency esophagogastroduodenoscopy was used in the diagnosis and treatment of massive upper gastrointestinal bleeding is presented. Accurate endoscopic diagnosis was made in 184; 58 patients underwent emergency operations to control bleeding with an overall operative mortality of 26%. Excluding 16 patients who underwent emergency portacaval shunting, the operative mortality was 7%. In six patients, the bleeding was controlled by endoscopic electrocoagulation. There were no complications. Emergency endoscopy should be done routinely as the primary diagnostic approach in the diagnosis of upper gastrointestinal bleeding.

1083 ELECTRICAL ASSESSMENT OF FUNCTIONAL LACTASE ACTIVITY IN CONSCIOUS MAN. (Eng.) Read, N. W.; Davies, R. J.; Holdsworth, C. D.; Levin, R. J. (Dept. Medicine, Univ. Sheffield, Sheffield S10 2TN, England). *Gut* 18(8):640-643; 1977.

The hypothesis that the magnitude of the lactose potential may reflect the functional lactase activity in the small intestine was tested. Using an electrical technique for measuring transjejunal potential differences (PDs) in conscious man, the electrogenic absorption of the hexoses liberated by hydrolysis of lactose was estimated. Lactose was infused into the jejunum of 1 normal control and 21 patients with diarrhea. The results were compared with jejunal lactase levels determined from biopsy specimens taken from the recording site immediately after infusion. The PD evoked by 100 mM lactose was significantly lower in patients with lactase levels below 4 U (lactase deficient) compared with subjects with normal lactase levels. There was also a significant correlation ($r=0.87$, $p<0.005$) between the magnitude of the lactose potential (expressed as the ratio of the maximum glucose transfer potential) and the mucosal lactase level in the hypolactasic subjects, but not in patients with normal lactase levels. Thus, in the subjects with lactase deficiency, the electrogenic transfer of hexose is clearly limited by the rate of lactose hydrolysis. Unlike other assessments of functional lactase activity, the electrical test provides a specific index of jejunal function and, moreover, can be adapted to investigate the possible disorders of small intestinal motility and secretion associated with hypolactasia.

1084 $^{14}\mathrm{CO}_2$ EXHALATION TEST. A NEW DIAGNOSTIC TOOL IN GASTROENTEROLOGY. (Ger.) Adlung, J.; Kelch, L.; Pancho, W.; Grazikowske, H.; Uthgennant, H. (I. Medizinische Klinik, Medizinische Hochschule Lubeck, Kronsforder Allee 71/73, D-2400 Lubeck, W. Germany). *Z. Gastroenterol.* 14(5):565-573; 1976.

The diagnostic value of three $^{14}\mathrm{CO}_2$ exhalation tests (^{14}C-tripalmitate fat resorption test, ^{14}C-lactose resorption test, and ^{14}C-glycocholic acid test) was studied in normal subjects and in patients with gastrointestinal diseases. The tripalmitate resorption test was performed in 20 normal subjects, in 18 patients with chronic recurrent pancreatitis without manifest pancreatic insufficiency, and in 8 patients with advanced malassimilation syndrome. The percentage of $^{14}\mathrm{CO}_2$ exhaled in 8 hr by the normal subjects averaged 9.1%. The $^{14}\mathrm{CO}_2$ exhalation was significantly reduced only in the patients with advanced malassimilation syndrome. The percentage of $^{14}\mathrm{CO}_2$ exhaled in 4 hr in the lactose resorption test averaged 11.9 ± 0.6% in 27 healthy controls, showing no significant difference in 16 patients with and without lactase deficiency who had undergone Billroth-II resection, nor in 6 patients with malabsorption and lactase deficiency. The glycocholic acid test was performed in 22 normal subjects, 8 patients with suspected bacterial infection of the small intestine, and in 11 patients with resected ileum or Crohn's disease. Significantly decreased $^{14}\mathrm{CO}_2$ exhalation was found in 16/19 patients, but false-negative results were obtained for 3 patients with resected ileum. Differentiation between bile salt malabsorption and bacterial infection was, however, impossible. The findings indicate the small value of the $^{14}\mathrm{CO}_2$ exhalation tests in gastroenterological disorders. Simplicity and convenience alone are not enough to recommend these tests.

1085 RADIOLOGICAL DIAGNOSIS OF TUMORS OF THE SMALL INTESTINE. (Ger.) Scherer, K.; Bucheler, E.; Erbe, W. (Radiologische Klinik, Universitatskrankenhaus Hamburg-Eppendorf, Martinistrasse 52, 2000 Hamburg 20, W. Germany). *Roentgenblaetter* 30(8):379-387; 1977.

The possibilities for radiologic diagnosis of tumors of the small intestine are reviewed. Barium x-ray; pharmacoradiological methods with cerulein; enteric-coated capsules of tartaric acid, sodium hydrogen carbonate, and dimethylpolysiloxane; Pro-Banthine or Buscopan; angiographic methods; and especially Sellink's probing method are suitable for the diagnosis of small intestinal tumors. The fractionated gastrointestinal passage method is problematic due to the possible superposition of intestinal loops in the small pelvis, and to the high time requirement for the examination. Angiography is especially suitable for the diagnosis of vascularized tumors with extramural spread, such as leiomyoma, neurinoma, hemangioma, and even carcinoid and duodenal carcinoma, despite their low degree of vascularization. Such poorly vascularized tumors as adenomas, lipomas, fibromas, neurofibromas, adenocarcinomas, metastases, and lymphoreticular sarcomas require intestinal passage tests for diagnosis.

1086 CARCINOEMBRYONIC ANTIGEN IN COLONIC LAVAGE. (Eng.) Winawer, S. J.; Fleisher, M.; Green, S.; Bhargava, D.; Leidner, S. D.; Boyle, C.; *et al.* (Memorial Hosp., 1275 York Ave., New York, NY 10021). *Gastroenterology* 73(4, Part 1):719-722; 1977.

Colonoscopic lavage was performed for assay of carcinoembryonic antigen (CEA) concentration in 35 patients with small and large colonic adenomas, in 11 patients with adenocarcinoma of the colon, and in 12 normal controls. CEA analyses were carried out in perchloric acid extracts of both colonic and plasma specimens by Sephadex G-200 gel column chromatography and electrophoresis. CEA concentration was considerably higher in colonoscopic lavage as compared to plasma. CEA concentration in normal controls (266 ng/mg protein) and in patients with colonic adenomas <1 cm in size (372 ng/mg) were not significantly different. CEA concentrations in patients with colonic adenomas >1 cm in size (1,151 ng/mg) and in patients with adenocarcinoma of the colon (1,509 ng/mg) were significantly higher than those observed in patients with small adenomas and in the normal controls. In all except two patients, plasma CEA concentrations were normal. Assay of CEA concentrations in colonic lavage may have potential application in the further assessment of the mucosa at risk for colon adenomas and for colon cancer. It does not appear to be accurate enough for diagnosis of colon cancer in individual patients.

1087 ENDOSCOPY AND POLYPECTOMY FOR THE EARLY DETECTION OF CARCINOMA OF THE RECTUM AND THE COLON (METHODS, SIGNIFICANCE, AND LIMITATIONS).

(Ger.) Otto, P.; Helmstaedt, D. (Medizinische Abteilung, Kreiskrankenhaus Grossburgwedel, 3006 Burgwedel 1, W. Germany). *Roentgenblaetter* 30(8): 400-407; 1977.

The state of the art of endoscopy in the early diagnosis and treatment of colorectal polyps and carcinomas is described. As routine rectoscopy is not justified in screening, it should be restricted to patients with occult blood in the feces and suspect anamnesis (perianal bleeding, irregular bowel movements, and abdominal spasms). If carcinoma is found rectoscopically, double-contrast x-ray examination should be performed in view of the possibility of double carcinoma. Coloscopy is necessary, if the source of the bleeding is not detected by rectoscopy or x-ray examinations. High coloscopy should be reserved for use in clinics, while sigmoidoscopy can be performed routinely. All colorectal polyps should be completely removed for correct histological diagnosis. Endoscopic polypectomy is an effective curative therapy, and surgery is necessary only in the case of polyps invading the muscular layer. In a series of 18,814 diagnostic and 3,490 therapeutic coloscopies, the mortality rate was 0.026% versus 1-1.5% after transabdominal colostomy with polypectomy.

1088 ARTERIOGRAPHY IN MALIGNANT NEOPLASMS OF THE BOWEL.

(Eng.) Campbell, D. R.; Mason, W. F.; Fraser, D. B.; Standen, J. R. (Victoria General Hosp., Halifax, Nova Scotia B3H 2Y9, Canada). *J. Can. Assoc. Radiol.* 28(3):204-207; 1977.

Experience with arteriography in the investigation of gastrointestinal bleeding and in the diagnosis of malignant bowel neoplasms is presented. Eighty patients with gastrointestinal bleeding were investigated by angiography over a 4-yr period. Nine had malignant neoplasms of the bowel, and the case reports of four of these patients are presented. Inconspicuous neovascularity was the most constant finding, best seen in leiomyosarcoma of the small bowel and adenocarcinoma of the colon. Neovascularity was not seen in a patient with reticulum cell sarcoma of colon, detected by extravasation. In two of the patients whose case reports are presented, the malignancies were missed by standard barium studies; these lesions involved the jejunum and ascending colon, resp. When other studies including endoscopy and barium examinations have failed to explain acute or chronic bleeding, an appreciable number of intestinal neoplasms may be demonstrated by arteriography.

1089 "HOT SPOT" ON HEPATIC SCINTIGRAPHY AND RADIONUCLIDE VENACAVOGRAPHY.

(Eng.) Gooneratne, N. S.; Buse, M. G.; Quinn, J. L., III; Selby, J. B. (Medical Univ. South Carolina Hosp., 80 Barre St., Charleston, SC 29401). *Am. J. Roentgenol.* 129(3):447-450; 1977.

Seven patients showing a localized area of increased uptake (hot spot) on ^{99m}Tc sulfur colloid liver scans are described. Dynamic studies were also carried out in four of the patients. The hot spot was associated with superior vena caval obstruction in five patients, with inferior vena caval obstruction in one, and with a hepatoma in one. Clinical evidence of vena caval obstruction was present in only three cases. Although a hot spot on static liver images usually indicates superior vena caval obstruction, the addition of radionuclide venacavography is recommended to confirm the diagnosis. A hot spot in the liver area in a radionuclide venogram of the lower limbs suggests inferior vena caval obstruction with collaterals via the liver.

1090 RADIOLOGIC SPECTRUM OF MELANOMA METASTATIC TO THE GASTROINTESTINAL TRACT.

(Eng.) Goldstein, H. M.; Beydoun, M. T.; Dodd, G. D. (M. D. Anderson Hosp. and Tumor Inst., Houston, TX 77030). *Am. J. Roentgenol.* 129(4):605-612; 1977.

Radiologic experience with 67 cases of metastatic melanoma involving the gastrointestinal tract is presented. The areas of involvement included the esophagus (5 cases), stomach (16 cases), duodenum (13 cases), small intestine (32 cases), colon (3 cases), liver (10 cases), gallbladder (3 cases), biliary tree and pancreas (4 cases), and mesentery and omentum (12 cases). Three patients with gastroduodenal lesions had a solitary nodule in the stomach that was detected only by double contrast examination. The intramural nodule was the most commonly encountered melanoma lesion in the stomach and duodenum. The nodules varied considerably in size. Approximately an equal number were present with and without a central ulceration, and both types of nodules were frequently encountered in the same patient. In two instances, gastric tumors also had a large extragastric component. The largest diversity of radiologic presentations of melanoma metastases occurred in the small intestine. A frequent manifestation was also one or more mural nodules. The "target" appearance occurred much less frequently in the small intestine than in the stomach and duodenum. In one case, innumerable melanoma nodules were present that resembled a polyposis syndrome. Seven patients demonstrated a large excavating mass in the mid or distal small bowel. In four cases, the entire mass was ulcerated. Angiography revealed a variety of vascular patterns of liver metastases; these ranged from hypervascular to totally hypovascular. Involvement of biliary ducts and pancreatic area was demonstrated primarily by percutaneous transhepatic cholangiography when jaundice was present. Biliary obstruction occurred in the porta hepatis region as well as at the distal common bile duct by peripancreatic nodes. Mesenteric masses were often purely extrinsic, causing impression upon and displacement of bowel loops. Because of extended survival due to improved chemotherapy and immunotherapy, the importance of careful radiologic examination of the melanoma patient is stressed.

1091 GRAY SCALE ULTRASONOGRAPHY OF CALCIFIED LIVER METASTASES.

(Eng.) Katragadda, C. S.; Goldstein, H. M.; Green, B. (M. D. Anderson Hosp. and Tumor Inst., Houston, TX 77030). *Am. J. Roentgenol.* 129(4):591-593; 1977.

Three cases of calcified liver metastases demonstrating acoustical shadowing on gray scale ultrasonography are reported. The patients had metastases from adenocarcinomas of the rectosigmoid, cecum, and splenic flexure, resp. Plain abdominal radiographs demonstrated the calcifications, but they were not readily apparent in most cases. It is possible that gray scale ultrasonography will disclose calcified metastases in a patient with a false-negative radiograph.

1092 ULTRASONIC SCANNING FOR FOCAL LIVER LESIONS.

(Eng.) Rasmussen, S. N.; Bagger, J.; Wagner, F.; Pedersen, J. F.: Kristensen, J. K. (Blegdamshospitalet, Blegdamsvej 3, DK-2200 Copenhagen N, Denmark). *Dan. Med. Bull.* 24(4): 151-153; 1977.

The diagnostic accuracy of ultrasonic bistable scanning for focal liver lesions was evaluated in 157 patients. Using the information from the patients' charts up to the date of the ultrasonic examination, these 157 cases were divided into two categories: (A) patients strongly suspected of having focal liver lesions and (B) patients only slightly suspected of having focal liver lesions. In group A the predictive values of positive (lesion present) and negative (no lesion present) ultrasonic findings were 81% (62-94%) and 33% (10-65%), resp., with 95% confidence limits in brackets. In group B the corresponding values were 74% (51-90%) and 64% (52-75%), resp. It is concluded that in group A no diagnostic profit was obtained by the ultrasonic examination, while some diagnostic profit was obtained in group B. The diagnostic accuracy increased with an increasing number of focal liver lesions and with increasing size of the lesions.

1093 A COMPARISON OF GRAY SCALE ULTRASOUND AND RADIONUCLIDE IMAGING FOR THE DETECTION OF FOCAL HEPATIC LESIONS: OPEN SHUTTER TECHNIQUE.

(Eng.) Zatz, L. M.; Gouldin, J. A.; Hanley, G. A. (Veterans Admin. Hosp [114], Palo Alto, CA 94304). *J. Clin. Ultrasound* 5(3):178-184; 1977.

The results of a new, previously described, gray scale ultrasound technique were compared with those of radionuclide imaging to determine if the former technique could replace the latter in the detection of focal hepatic lesions. The conventional B scan ultrasound unit was modified by the addition of a specially built logarithmic amplifier and a high resolution nonstorage oscilloscope. One hundred and five consecutive patients submitted for radionuclide imaging of the liver were examined with ultrasound using a standardized scanning system. The ultrasound technique produced scans that were technically poor or inadequate in 37% of the patients studied. In the studies in which there has been confirmation, the ultrasound diagnosis was accurate in 73% and the radionuclide diagnosis was correct in 83%. The combined accuracy of the two studies was 93%. In 11 patients, ultrasound more clearly defined the lesion that were demonstrated by both techniques or demonstrated the nature of suspicious or equivocal areas on the radionuclide images. In 48 patients, the radionuclide scan imaged the liver more completely or demonstrated lesions more clearly than did the ultrasound examination. This specific approach to ultrasound gray scale imaging appears to be a valuable supplemental tool to radionuclide imaging, but at its present stage of development, cannot replace it as a routine screening technique for hepatic disease.

1094 THE INTERPRETATION OF THE RADIONUCLIDE SUBTRACTION SCAN IN PANCREATIC CARCINOMA.

(Eng.) Andrews, J. T.; Kidd, G.; Steven, L. W.; McKay, W. J.; Lichtenstein, M. (Royal Melbourne Hosp., Melbourne, Australia). *Australas. Radiol.* 21(1):53-59; 1977.

An attempt was made to indicate the different types of radionuclide subtraction scan patterns that can occur in pancreatic carcinoma. Forty-four consecutive patients with established clinical or proven histological diagnosis of carcinoma of the pancreas were followed from a total series of 800 who presented for radionuclide subtraction scanning. Over one-third of the patients studied presented with ^{75}Se-selenomethionine uptake in the tumor region. The tumor was diagnosed because of the presence of a filling defect in an otherwise normal pancreatic scan in only four cases. Despite the differing scan presentations of pancreatic carcinoma, it was generally not possible to differentiate a benign from a malignant lesion on the basis of the scan results alone.

1095 OPERATIVE CHOLANGIOGRAPHY. NEW CHOLANGIOGRAM CATHETER CLAMP AND IMPROVED TECHNIQUE. (Eng.) Borge, J. (Queen of the Valley Hosp., 980 Traneas St., Napa, CA 94558). *Arch. Surg.* 112(3): 340-342; 1977.

Experience with 225 cases of routine operative cholangiography, utilizing a new squeeze-locking, split-loop clamp to secure the catheter inside the cystic duct plus an x-ray film technique using two different dye concentrations is presented. No surgical or procedural difficulty was experienced in any of the 225 cases. Additional operating time for the procedure averaged under 5 min, with only one inconclusive x-ray film study. These results suggest that the new catheter clamp and the two-film technique provide a mechanical simplification of the procedure and that many of the causes of inconclusive x-ray film study have been eliminated.

1096 AN IMPROVED METHOD OF EXAMINING THE STOMACH BY THIN-COATING DOUBLE-CONTRAST TECHNIQUE. (Ger.) Tenner, R.; Kurosawa, A. (Tinsdaler Weg 21, 2000 Wedel/Holst., W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 125(6): 490-496; 1976.

1097 PHARMACOKINETIC INVESTIGATIONS OF A NEW GALLBLADDER CONTRAST MEDIUM--IODOXAMINIC ACID. (Ger.) Mahner, B.; Kruger, R.; Siehr, U.; Wilhelmi, U. (Stadt. Krankenhaus Spandau, 1000 Berlin 20-Spandau, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 125(6): 556-559; 1976.

1098 A RAPID METHOD OF ROENTGENOLOGIC EXAMINATION OF THE SMALL INTESTINE WITH BUSCOPAN®. (Jpn.) Watanabe, T.; Ohata, T.; Izuno, I. (Sch. Medicine, Shinshu Univ., Japan). *Nippon Acta Radiol.* 36(4):305-308; 1976.

1099 THE USE OF UROLOGICAL CATHETERS FOR THE SURGICAL EXPLORATION OF THE BILIARY TRACT. (Spa.) Bravo, J. L.; Vazquez, E.; Alberu, J. (Instituto Nacional de la Nutricion, Mexico 22, D.F.). *Rev. Invest. Clin.* 29(1):9-11; 1977.

1100 ELIMINATION OF INDOCYANINE GREEN (ICG) IN LIVER DISEASES AFTER INCREASED DYE LOADING AND PROLONGED TIME OF MEASUREMENTS. (Pol.) Juszczyk, J.; Grala, B.; Adamek, J.; Kryska, A.; Panczyszak, M. (Acad. Medicine, ul. Wincentego 1, 61-003 Poznan, Poland). *Pol. Arch. Med. Wewn.* 56(2/8):119-132; 1976.

1101 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY WITH THE CHIBA NEEDLE. (Dut.) Yap, S. H.; Snel, P.; Rosekrans, P. A. M.; Wiggers, R. H.; Van Tongeren, J. H. M. (St. Radboud Ziekenhuis, Nijmegen, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(3):96-100; 1977.

1102 THERMOVISION AS A DIAGNOSTIC METHOD IN GASTROENTEROLOGY. (Rus.) Sukharev, V. F. (I. I. Dzhanelidze Scientific Res. Inst. First Aid, Leningrad, USSR). *Sov. Med.* (12):98-101; 1976.

1103 THE PHYSICS OF THE FIBRE-OPTIC ENDOSCOPE. (Eng.) Hopkins, H. H. *In: Modern Topics in Gastrointestinal Endoscopy.* Edited by K. F. R. Schiller and P. R. Salmon. (Chicago: William Heinemann Medical Books): 15-62; 1976.

1104 LABORATORY DIAGNOSIS. (Eng.) Sleisenger, M. H.; Brandborg, L. L. *In: Malabsorption. Volume XIII in the Series, Major Problems in Internal Medicine.* Edited by L. H. Smith, Jr. (Philadelphia: W. B. Saunders Co.): 65-90; 1977.

1105 EXPERIENCE WITH THE APPLICATION OF A RADIOISOTOPE TECHNIQUE IN THE STUDY OF GASTRIC EMPTYING. (Ita.) Corinaldesi, R.; Luchetta, L.; Putti, C.; Ricci, P.; Casadio, R., Fabbri, R.; *et al.* (Istituto di Gastroenterologia dell'Universita di Bologna, Bologna, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(18):1471-1477; 1976.

1106 STAGES AND LIMITS OF DIAGNOSTICS IN LIVER DISEASES. (Ger.) Martini, G. A. (Medizinische Universitatsklinik, Mannkopffstrasse 1, D-3550 Marburg/Lahn, W. Germany). *Internist (Berlin)* 18(3):149-155; 1977.

1107 STUDY OF HUMORAL IMMUNITY IN HUMAN SCHISTOSOMIASIS. (Fre.) Pinon, J. M.; Dropsy, G. (Hopital de Reims, 51100, Reims, France). *Bull. Soc. Pathol. Exot.* 69(3):238-244; 1976.

1108 PLASMA BINDING, RENAL AND BILIARY EXCRETION OF TWO INTRAVENOUS CHOLANGIOGRAPHIC AGENTS IN NORMAL AND JAUNDICED SUBJECTS [Abstract]. (Eng.) Doran, J.; Vennart, W.; Bell, G. D. (City Hosp., Nottingham, England). *Gut* 18(11):A984; 1977.

1109 ASSESSMENT OF OBSERVER ERROR IN UPPER GASTROINTESTINAL ENDOSCOPY [Abstract]. (Eng.) Holden, R. J.; Crean, G. P. (Southern General Hosp., Glasgow, Scotland). *Gut* 18(11):A941; 1977.

1110 NEUROLEPTANALGESIA VERSUS DIAZEPAM AS A PREMEDICATION FOR UPPER GI TRACT ENDOSCOPY [Abstract]. (Eng.) Birt, C.; Davies, G.; Ashby, B. S. (General Hosp., Southend, England). *Gut* 18(11):A940; 1977.

1111 HEMOCCULT TESTING [Letter to Editor]. (Eng.) Ostrow, J. D.; Fleisher, M.;

Schwartz, M. K.; Winawer, S. J. (Veterans Admin. Hosp., Philadelphia, PA 19104). *Gastroenterology* 73(5):1185-1186; 1977.

1112 TWO DIFFERENCES IN AMINOPYRINE BREATH TESTS DUE TO ALCOHOLISM [Abstract]. (Eng.) Iber, F. L.; Bowman, M. A.; Krause, S. L. (Veterans Admin. Hosp., Baltimore, MD). *Gastroenterology* 73(5):1227; 1977.

1113 LIVER VOLUME DETERMINATION BY ULTRASOUND: A FEASIBILITY STUDY. (Eng.) Carr, D.; Duncan, J. G.; Railton, R.; Smith, C. B. (Glasgow Royal Infirmary, Glasgow, Scotland). *Br. J. Radiol.* 49(585):776-778; 1976.

1114 PREDICTIVE VALUE OF LIVER SCINTIGRAPHY FOR DEMONSTRATION OF METASTASES IN MALIGNANT GASTROINTESTINAL DISORDERS. (Eng.) Nilsson, T.; Edeling, C. J.; Lavaetz, O.; *et al.* (Glostrup Hosp., Glostrup, Denmark). *Acta Chir. Scand.* 142 (3):231-234; 1976.

1115 ANGIOGRAPHY IN GASTROINTESTINAL HEMORRHAGE. (Eng.) Wilson, E. S. (Burlington County Memorial Hosp., Mount Holly, NJ). *J. Med. Soc. N.J.* 73(6):487-495; 1976.

1116 AN ARM CHAIR STUDY OF CLINICAL DECISION-MAKING IN GASTROENTEROLOGICAL OUT-PATIENTS [Abstract]. (Eng.) Friis, H.; Hansen, S. W.; Binder, V.; Wulff, H. R.; Riis, P. (Herlev Univ. Hosp., DK-273o Herlev, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):20; 1977.

1117 PEROPERATIV [sic] CHOLEDOCHOSCOPY [Abstract]. (Eng.) Rosseland, A. R. (Centralhosp. Akershus, N-1474 Nordbyhagen, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):83; 1977.

1118 MYOCARDIAL INFARCTION INCIDENTAL TO EMERGENCY ENDOSCOPY. (Jpn.) Shiraki, T.; Tanisawa, Y.; Kawasaki, H.; *et al.* (Kyoto Prefectural Univ. Medicine, Kyoto, Japan). *Jpn. J. Gastroenterol.* 73(6):677-691; 1976.

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1142 ASSESSMENT OF THE VALUE OF SELECTED METHODS IN THE DIAGNOSIS OF LIVER DISEASES WITH SPECIAL REFERENCE TO VIRAL HEPATITIS ON THE BASIS OF PERSONAL OBSERVATIONS. (Pol.) Sowa, J. (Klinika Chorob Zakaznych Instytutu Medycyny Wewnetrznej AM, Karkow, Poland). *Pol. Tyg. Lek.* 32(2): 71-72; 1977.

1143 DOUBLE CONTRAST EXAMINATION OF THE SMALL BOWEL. (Eng,) Ekberg, O. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Gastroenterol. Radiol.* 1(4):349-353; 1977.

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1145 CLINICAL INFORMATION FROM MEDICAL IMAGES. A COMPARISON OF TWO TYPES OF ULTRASONIC IMAGE IN THE DETECTION OF FOCAL INTRAHEPATIC LESIONS. (Eng.) Robertson, D. A. R.; Evans, A. L.; McCreath, G. (Southern General Hosp., Glasgow, Scotland). *Br. J. Radiol.* 50(595):499-503; 1977.

See also, 0826, 0827, 0902, 0904, 0905, 1038, 1146, 1152, 1153, 1176, 1179, 1185, 1188, 1195, 1231, 1241, 1251, 1269, 1272, 1299, 1302, 1309, 1342, 1344, 1345, 1346, 1348, 1353, 1366, 1368, 1369, 1376, 1384, 1395, 1399, 1402, 1444, 1467, 1476, 1486, 1519, 1529, 1530, 1531, 1539, 1545, 1550, 1558, 1559, 1560, 1561, 1562, 1563, 1578, 1580, 1587, 1589, 1594, 1614, 1622, 1652, 1657, 1693.

GASTROINTESTINAL DISEASES

ESOPHAGUS

1146 INTRODUCTION OF A PNEUMATIC DILATOR WITH THE HELP OF A GASTROSCOPE IN ACHALASIA--A NEW, NONTRAUMATIC TECHNIC.

(Eng.) Singal, S. K.; Barfi, R.; Hossain, T. Z. (Allen Park Veterans Admin. Hosp., Detroit, MI). *Am. J. Gastroenterol.* 67(5):494-496; 1977.

A new endoscopic technique to introduce a pneumatic dilator through the lower esophageal sphincter is described in a patient with achalasia. The patient, a 96-yr-old man, was found to have a markedly dilated esophagus with a narrow distal end. An esophageal motility study showed no peristaltic response to swallowing, increased lower esophageal sphincter pressure with no relaxation on swallowing, and a positive response to the urecholine test. A loop of surgical suture (27.5 cm diameter) was tied to the flexible spring-wire tip of a Jackson-Mosher pneumatic dilator before it was passed into the esophagus with the patient lying on his left side. A GIF-K gastroscope was introduced into the esophagus beside the dilator. The loop of silk was identified and caught by biopsy forceps passed through the gastroscope. The forceps were then withdrawn so that their tip lay just inside the end of the biopsy channel. Under direct vision, the gastroscope was passed through the lower esophageal sphincter into the stomach pulling the silk and the dilator along with it. Once the lower end of the pneumatic bag was ascertained to lie below the lower esophageal sphincter area, the biopsy forceps were opened to free the silk loop. The gastroscope was then removed while the pressure was maintained on the stylet to prevent the dilator from being withdrawn. The position of the pneumatic bag was then adjusted fluoroscopically, and a pressure of 6.2 kg/6.5 cm^2 was applied for 2 min. The patient improved markedly after dilatation. This technique can be very useful in patients with achalasia associated with either sigmoid-shaped esophagus or epiphrenic diverticulum where blind introduction of the dilator may not be possible.

1147 LONG-TERM ESOPHAGEAL FUNCTION FOLLOWING REPAIR OF ESOPHAGEAL ATRESIA.

(Eng.) Orringer, M. B.; Kirsh, M. M.; Sloan, H. (C7175 Univ. Hosp., Ann Arbor, MI 48109). *Ann. Surg.* 186(4):436-443; 1977.

The long-term esophageal motor disturbances and incidence of gastroesophageal reflux after surgical repair of esophageal atresia were evaluated in 22 patients postoperatively. The patients were evaluated by personal interview and by esophageal manometry and acid reflux testing. Previous barium swallow examinations had demonstrated varying degrees of anastomotic narrowing (12 patients), abnormal esophageal motor function (11), gastroesophageal reflux (2), and hiatal hernia (1). Ten patients experienced intermittent dysphagia for solid foods. Seven had typical symptoms of gastroesophageal reflux. Esophageal function tests, including manometry and intraesophageal pH recording, demonstrated varying abnormalities of esophageal motility in 21 patients and moderate to severe gastroesophageal reflux in 13. Two patients required reconstruction of the esophagogastric junction for control of severe reflux esophagitis. The unexpected high incidence of gastroesophageal reflux in these patients, coupled with abnormal esophageal motility that impairs normal acid clearing, renders them more prone to reflux esophagitis. Careful long-term evaluation for gastroesophageal reflux and its complications is indicated following primary repair of esophageal atresia. Evaluation of esophageal function with intraesophageal pressure and pH recordings is a far more sensitive indicator of esophageal physiology than the barium swallow examination.

1148 ROLE OF LOWER ESOPHAGEAL SPHINCTER INCOMPETENCE IN RECURRENT PNEUMONIA AFTER REPAIR OF ESOPHAGEAL ATRESIA.

(Eng.) Whitington, P. F.; Shermeta, D. W.; Seto, D. S. Y.; Jones, L.; Hendrix, T. R. (Univ. Wisconsin Sch. Medicine, Madison, WI 53706). *J. Pediatr.* 91(4):550-554; 1977.

To define the etiology of recurrent aspiration pneumonitis after the successful repair of esophageal atresia (EA), esophageal manometry was performed in eight patients (aged 11 weeks to 20 yr) who had undergone repair of EA and tracheoesophageal fistula. Two patients who had had recurrent pneumonia had subnormal lower esophageal sphincter pressure; they also had a history of severe regurgitation, and a barium esophagram demonstrated free gastroesophageal reflux. The lower esophageal sphincter incompetence in these patients was apparently corrected by the administration of bethanechol. These studies show that recurrent pneumonitis after repair of EA is often due to an incompetent lower esophageal sphincter with reflux and aspiration.

1149 PHARMACOTHERAPY OF AN ULCER IN BARRETT'S ESOPHAGUS: CARBENOXALONE AND CIMETIDINE.

(Eng.) Thompson, W. G.; Barr, R. (Ottawa Civic Hosp., 1053 Carling Ave., Ottawa, Ontario K1Y 4E9, Canada). *Gastroenterology* 73(4):808-810; 1977.

The case of a 70-yr-old man who had specialized columnar epithelium in the esophagus up to the upper esophageal sphincter, 19 cm from the incisor teeth, is presented. The patient had a small sliding hiatal hernia, but the lower esophageal sphincter was located at 39-41 cm. Above the sphincter, the patient had large peptic ulcers that failed to heal after 1 yr of a conventional antireflux regimen. Carbenoxalone sodium (50 or 100 mg, t.i.d.) led to healing in 3 months. However, the ulcers recurred after discontinuation of the drug. On a second attempt, carbenoxalone effected modest healing, but was stopped because of hypertension and hypokalemia. Cimetidine therapy (300 mg, t.i.d. and 600 mg at bedtime) led to complete healing of the ulcer within a month. The authors conclude that both carbenoxalone and cimetidine are useful in the treatment of an ulcer in Barrett's esophagus. However, cimetidine may be more rapidly effective and does not produce dangerous side-effects.

1150 MANAGEMENT OF COMPLICATIONS OF FUNDOPLICATION AND BARRETT'S ESOPHAGUS.

(Eng.) Burnett, H. F.; Read, R. C.; Morris, W. D.; Campbell G. S. (Veterans Admin. Hosp., 300 E. Roosevelt Rd., Little Rock, AR 72206). *Surgery* 82(4):521-530; 1977.

Experience with patients requiring reoperation for complications of fundoplication and with the management of columnar-lined distal esophagus (Barrett's) is reviewed. Fifteen patients required reoperation for gastric fistula (6), progressive esophagitis/stricture (4), obstruction by the wrap (3), carcinoma (1), failed pericardioesophagoplasty (1), and gastric ulcer (1). Of the six patients with gastric fistulas, five had transthoracic Nissen procedures, and three died without surgical closure having been attempted. One survived after operative closure, and two survived after esophageal exclusion. Progressive esophagitis/stricture followed abdominal Nissen operations in two patients, Belsey procedure (1 case), and Belsey with Collis gastroplasty (1 case). Remedial thoracic Nissen operations gave good results in two patients. Esophageal obstruction by the wrap in three patients was managed by resection and distal colon interposition, with good results. Those with cancer, a failed pericardio-esophagogastrectomy, Woodward procedure, and wedge resection, resp., and all are doing well. Eight patients had Barrett's esophagus, one of whom had an associated cancer. Fundoplication gave good results in three of five patients; there was one death from gastric fistula. Failed operations on the gastroesophageal junction can be rendered by carefully selected surgical techniques based on a thorough preoperative evaluation of the patient. Barrett's esophagus is managed successfully with fundoplication and dilatation. There is an increased incidence of cancer in this disorder, which demands long-term follow-up.

1151 EXPERIENCE IN THE MANAGEMENT OF ACUTE ESOPHAGEAL BURN.

(Ger.) Muller, H. (Ful-, Orr-, Es Bronchologiai Osztaly, Magyei Korhaz, 6601 Szentes, Hungary). *HNO* 25(5):168-171; 1977.

The treatment of 151 patients with acute esophageal burns caused by corrosive substances is described. The patients included 4 2- to 4-yr-old children, and 23 patients in severe, critical condition. Pain relief, administration of atropine and pipolphenin injection are necessary at first, but gastric lavage is not performed, and the poison is not neutralized. The principal treatment consists of cortisone administration and mechanical dilatation of the esophagus to prevent the formation of granulation tissue and esophageal stricture. Blind bougienage is contraindicated because of its inherent hazards. Cortisone is administered to adults in daily doses of 200-400 mg, and the dose is reduced by 50-100 mg after 5-8 days. Children (up to age 10) receive 100-200 mg/day, depending on age. After cessation of dysphagia, cortisone is replaced by prednisolone, which is given in daily doses of 20-30 mg for maintenance. Antibiotic therapy with penicillin (3-5 million U for adults) is absolutely necessary during cortisone therapy. All patients with slight to medium degree burns were healed by cortisone therapy, but 6 of the 23 patients with severe burns died (5 from uncontrollable bleeding, 1 from perforation of the trachea). Gastric perforation and gastric ulcer as complications of cortisone treatment were not observed. The findings indicate that cortisone is of great value in the treatment of severe esophageal burns.

1152 THE ROLES OF ESOPHAGOSCOPY VS. RADIOGRAPHY IN DIAGNOSING BENIGN PEPTIC ESOPHAGEAL STRICTURES.

(Eng.) Hiatt, G. A. (Fronk Clinic, 839 South Beretania St., Honolulu, Hawaii 96813). *Gastrointest. Endosc.* 23(4):194-195; 1977.

The correlation between endoscopic and radiographic diagnosis of benign peptic esophageal stricture was studied retrospectively in 52 patients found to have significant strictures at esophagoscopy. Radiographs read as positive for stricture ranged from 40% to 34.1% when taken 1-8 months before endoscopy. None of 10 patients who had a barium swallow after the endoscopic diagnosis was reported as having a stricture. These data indicate that radiography is not entirely reliable in the diagnosis of benign peptic esophageal strictures and that esophagoscopy should be routinely employed when dysphagia is a symptom.

1153 REMARKABLY LARGE, BENIGN ESOPHAGEAL TUMOR. DIFFICULTIES IN DIAGNOSIS.

(Eng.) Orchard, J. L.; Peternel, W. W.; Arena, S. (Mercy Hosp., Pittsburgh, PA 15219). *Am. J. Dig. Dis.* 22(3):266-269; 1977.

The case of a patient with a leiomyoma of the esophagus is reported because the tumor reached extraordinary size before becoming symptomatic and caused some difficulty in diagnosis despite its large size. The diagnosis was made with the fiberoptic esophagoscope after standard roentgenograms and rigid esophagoscopy were inconclusive. The tumor was removed through a cervical incision. Attention is called to the potential fatal outcome of these lesions.

1154 ESOPHAGEAL ULCERS IN IMMUNODEFICIENCY WITH ELEVATED LEVELS OF IgM AND NEUTROPENIA.

(Eng.) Vanderhoff, J. A.; Rich, K. C.; Stiehm, E. R.; Ament, M. E. (Dept. Pediatrics, MDCC 22-442 UCLA, Center Health Sciences, Los Angeles, CA 90024). *Am. J. Dis. Child.* 131(5):551-552; 1977.

The case of a 17-yr-old boy with immunodeficiency, elevated levels of immunoglobulin M, and neutropenia who developed distal esophageal ulcers and stricture is presented. Although his lower esophageal sphincter pressure was decreased, he had normal acid reflux test results, normal findings from acid clearing studies, and absence of diffuse esophagitis at esophagoscopy. Neutropenia and hypogammaglobulinemia are postulated to be pathogenic factors in his esophageal ulcers.

1155 MINUTE EARLY CARCINOMA OF THE ESOPHAGO-GASTRIC JUNCTION. (Jpn.) Suzuki, S.; Nagayo, T.; Murakami, H.; Takemoto, T. (Tokyo Women's Medical Coll., Tokyo, Japan). *Stomach Intest. (Tokyo)* 11(6):697-704; 1976.

1156 MANAGEMENT OF INFANTS WITH DIAPHRAGMATIC HERNIA. (Eng.) Collins, D. L.; Marks, L.; Edwards, D.; Kirkpatrick, S. E.; Nyhan, W. L. (Univ. California San Diego Sch. Medicine, San Diego, CA 92103). *West. J. Med.* 127(6):479-486; 1977.

1157 EXPERIENCES WITH CONTINUOUS GASTROSTOMY [Abstract]. (Eng./Ger.) Klinke, F.; Heiseke, E.; Wedell, J. (Kreiskrankenhaus Herford, D-4900 Herford, W. Germany). *Langenbecks Arch. Chir.* 345:599; 1977.

1158 CRITERIA FOR OPERATIVE TECHNIQUES FOR AVOIDANCE OF SUTURE INSUFFICIENCY WITH ESOPHAGOGASTROSTOMY [Abstract]. (Eng./Ger.) Kunath, U.; Stelzner, F. (Chirurgische Universitatsklinik, D-5300 Bonn-Venusberg, W. Germany). *Langenbecks Arch. Chir.* 345:599-600; 1977.

1159 COLONIC REPLACEMENT OF THE OESOPHAGUS [Abstract]. (Eng.) Roed-Petersen, K.; Pedersen, S. A.; Madsen, C. M. (Odense Univ. Hosp., Odense, Denmark). *Scand. J. Gastroenterol.* 12 (Suppl. 45):78; 1977.

1160 FILM SHOWING COLONIC REPLACEMENT OF THE OESOPHAGUS [Abstract]. (Eng.) Madsen, C. M. (Odense Univ. Hosp., Odense, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):59; 1977.

1161 DISORDERS OF ESOPHAGEAL MOTILITY. (Ger.) Koelz, H. R.; Lepsien, G. (Stadtspital Triemli, Medizinische Klinik, Birmensdorfer Str. 497, CH-8063 Zurich, Switzerland). *Z. Gastroenterol.* 15(3):167-174; 1977.

1162 CURRENT THERAPY OF ESOPHAGEAL ATRESIA [Abstract]. (Ger.) Hollwarth, M.; Sauer, H. (No affiliation given). *Wien. Med. Wochenschr.* 127 (15):494; 1977.

1163 ANASTOMOTIC LEAKAGE AFTER CURE OF ESOPHAGEA ATRESIA. (Fre.) Revillon, Y.; Bondeux, D.; Lavaud, J.; Fekete, C. M.; Cloup, M.; Pellerin, D. (Hopital des Enfants Malades, 149, rue de Sevres, 75015 Paris, France). *Ann. Chir. Infant.* 18(3):209-217; 1977.

1164 TOTAL PARENTERAL ALIMENTATION (TPA) WITH A COMBINATION OF CARBOHYDRATES FOR SURGICAL PATIENTS WITH CARCINOMA OF THE ESOPHAGUS. (Chi.) Wang, P. Y.; Hsu, T. L.; Chien, K. Y.; Lu, K. S.; Meng, H. C. (Veterans General Hosp., Taipei, Taiwan). *Chi. Med. J. [Engl.]* (22):144-159; 1975.

1165 RADICALNESS OF SURGERY FOR ESOPHAGEAL CANCER. (Rus.) Shanin, V. E. (Khimki Central Regional Hosp., Moscow Oblast, Khimki, USSR). *Klin. Khir.* (3):65-66; 1977.

1166 COMBINED BENIGN AND MALIGNANT TUMORS OF THE ESOPHAGUS. (Ger.) Farschidpour, D.; Nadji, A. (Krankenhauses Farabi, Universitat Tehran, Tehran, Iran). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 126(3):272; 1977.

1167 REPORT OF A CASE OF GIANT EPIPHRENIC DIVERTICULUM. (Spa.) Gasco Benaque, J. L.; De Pablo Redondo, L. (Residencia Sanitaria "Virgen de la Salud," Toledo, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(4):463-468; 1977.

1168 ESOPHAGEAL LOCALIZATION OF FOLLICULAR DYSKERATOSIS (DARIER'S SYNDROME). RADIOLOGICAL ASPECTS. REPORT OF FOUR CASES. (Fre.) Larregue, M.; Katz, M.; Gasquet, C.; Lansmann, M.; Bressieux, J. M. (Service de Dermatologie, Hotel-Dieu, F 86000 Poitiers, France). *Ann. Med. Interne* 128(5):487-491; 1977.

1169 MORPHOLOGICAL CHANGES IN GASTRIC MUCOSA IN CHRONIC ESOPHAGITIS. (Rus.) Alexandrova, N. M.; Kolycheva, N. I.; Dril, L. Ya. (Scientific Res. Inst. Oncology Radiology, Kazakh SSR Ministry Public Health, Alma-Ata, USSR). *Klin. Med.* 55(4): 36-39; 1977.

1170 SLIDING HIATAL HERNIA. (Ita.) Montorsi, W. (Ospedale Maggiore "Policlinco," Pad. Beretta Est, Via F. Sforza, 35, 20135 Milano, Italy). *Minerva Med.* 68(1):1-12; 1977.

1171 EVALUATION OF THE INFRACARDIAC BURSA IN THE PATHOGENESIS OF SLIDING HIATAL HERNIA. (Ger.) Kunath, U. (Zentrum der Chirurgie, Johann Wolfgang Goethe-Universitat, Theodor-Stern-Kai 7, D-6000 Frankfurt am Main, W. Germany). *Langenbecks Arch. Chir.* 343(2):161-172; 1977.

1172 REFLUX ESOPHAGITIS OF ARTIFICIAL ESOPHAGUS RECONSTRUCTED FROM THE LARGE INTESTINE IN CHILDREN. (Rus.) Shapiro, G. D. (Novosibirsk Oblast Clinical Hosp., Novosibirsk, USSR). *Vestn. Khir.* 118(2):82-83; 1977.

1173 GASTROESOPHAGEAL REFLUX DISEASE. (Ger.) Guller, R. (Medizinische Universitats-Poliklinik, Hebelstrasse 1, CH-4056 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107(18):623-626; 1977.

1174 THE Z BAND. ENDOSCOPIC AND HISTOLOGICAL ASPECTS. (Ger.) Clemencon, G.; Gloor, F. (Frohheimweg 12, CH-4600 Olten, Switzerland). *Z. Gastroenterol.* 14(7):704-705; 1976.

See also, 0819, 1082, 1090, 1109, 1144, 1232, 1262, 1393, 1592, 1652, 1657.

STOMACH

1175 CARBOHYDRATE CONTENT OF ENDOSCOPIC GASTRIC BIOPSIES IN CARCINOMA OF THE STOMACH. (Eng.) Machado, G.; Clamp, J. R.; Read, A. E. (Bristol Royal Infirmary, Bristol, England). *Gut* 18(8):670-672; 1977.

Mucous glycoproteins were studied in gastric biopsies of 37 normal controls and in the cancerous and normal biopsies of 27 patients with gastric carcinoma. There were statistically significant ($p<0.001$) changes in mannose and *N*-acetylgalactosamine levels in normal and carcinomatous stomachs in both secretors and nonsecretors. The mean mannose level in the 25 normal secretors was 1.0 (residue of mannose relative to a galactose content of 6.0 residues). Among the 12 cancer patients who were secretors, the mean mannose levels in the cancerous and noncancerous areas were 1.7 and 1.5, resp. In the nonsecretors, the corresponding mannose contents were 1.3, 2.2, and 2.0, resp. The levels of *N*-acetylgalactosamine in the secretors were 4.0, 2.6, and 2.8, resp., while in the nonsecretors they were 3.8, 2.2, and 2.6, resp. These studies show that there is a significant increase in mannose content and a significant decrease in *N*-acetylgalactosamine in the gastric mucus of patients with gastric cancer, in comparison with the levels in normal subjects. The fact that both the cancerous and noncancerous areas of cancer-bearing stomach show carbohydrate changes suggests a change in the relative amounts of these two fractions and therefore a corresponding change in the cells giving rise to them. Carbohydrate analysis of adherent gastric mucus could be useful in detecting susceptibility to gastric cancer.

1176 OUTCOME OF GASTRIC CARCINOMA DETECTED BY GASTRIC MASS SURVEY IN JAPAN. (Eng.) Kaneko, E.; Nakamura, T.; Umeda, N.; Fujino, M.; Niwa, H. (Sch. Medicine, Hamamatsu Univ., Hamamatsu Japan). *Gut* 18(8):626-630; 1977.

To determine the value of the gastrocamera in mass screening for gastric carcinoma, the results of six selected mass survey groups consisting of 90,557 subjects were studied. One hundred thirty seven cases of gastric carcinoma were detected and followed up postoperatively for up to 16 yr. They consisted of 55 cases of early and 74 cases of advanced carcinoma; the stage of malignancy was unknown in the remaining cases. The relative 5-yr and 10-yr survival rates in the 137 cases were 0.628 and 0.642, resp., and those for early carcinoma were 0.959 and 1.016, resp. These rates are remarkably high. The 5-yr survival rate in those who were followed up after operation for more than 5 yr (83 cases) was 0.554, which is much higher than that of outpatients who presented only after developing symptoms. The use of the gastrocamera markedly improved the detection rate of gastric carcinoma in mass screening programs.

1177 CELL-MEDIATED IMMUNITY IN PATIENTS WITH GASTRIC CARCINOMA: CORRELATION BETWEEN CLINICAL STAGE AND IMMUNOCOMPETENCE. (Eng.) Branco, P. D.; Raia, A. A.; Varella, A. D.; Kopersztich, S.; Abrao, S.; Nakaie, M.; Castro, J. P. (Facultade de Medicina, Universidade de Sao Paulo, Sao Paulo, Brazil). *Chir. Gastroenterol.* 11(2): 187-191; 1977.

To determine whether defective cell-mediated immunity (CMI) can predispose to the establishment and progression of neoplasms, CMI was investigated in 75 patients who had undergone surgery for gastric carcinomas. The 2,4-dinitrochlorobenzene (DNCB) sensitization test was used as an index of CMI. The patients were divided into three groups according to the stage of the tumor: patients with localized and resectable tumors (LD); patients with disseminated tumors, but with the progression of the disease restricted to the regional lymph nodes (DD), in whom it was possible to achieve some surgical procedure; and patients with metastatic disease with great extension of the primary disease and with widespread metastasis (MD). In the 27 patients with LD, 17 negative and 10 positive DNCB reactions (62.96% and 37.04%, resp.) were observed. In 26 patients with DD, 17 negative (65.38%) and 9 positive reactions (34.62%) were seen. In 22 patients with MD, 20 negative (90.9%) and 2 positive reactions (9.1%) were observed. During a 6-month follow-up, 20 DNCB-negative patients died, while only 4 DNCB-positive patients died. The results demonstrate a marked difference in CMI between patients with MD, DD, and LD.

1178 GASTRIC MUCOSAL BIOPSY IN EOSINOPHILIC (ALLERGIC) GASTROENTERITIS. (Eng.) Katz, A. J.; Goldman, H.; Grand, R. J. (Children's Hosp. Medical Center, Boston, MA 02115). *Gastroenterology* 73(4):705-709; 1977.

Six patients were studied to assess the value of gastric mucosal biopsy in establishing the diagnosis of eosinophilic (allergic) gastroenteritis. The gastric mucosa was abnormal in all cases, revealing marked eosinophilic infiltration and necrosis and regeneration of the epithelial cells. A single gastric biopsy was diagnostic in all six cases and provided the primary diagnosis in three. Intestinal biopsies varied considerably in appearance even in the same patient, ranging from normal to villous shortening and crypt hyperplasia with epithelial cell necrosis. Other patients with peripheral eosinophilia alone or intestinal disease of other etiologies had normal gastric biopsies. Gastric mucosal biopsy appears to be valuable in the diagnosis of eosinophilic gastroenteritis and should be routinely obtained. The gastric lesion may contribute to the protein loss, gastrointestinal bleeding, and iron-deficiency anemia observed in this condition.

1179 HEMOLYTIC SUBSTANCES IN THE GASTRIC CONTENTS: FREQUENCY OF LYSOLECITHIN DETECTION. (Ger.) Clemencon, G.; Burgi, W. (Kantonsspital Olten, CH-4600 Olten, Switzerland). *Schweiz. Med. Wochenschr.* 107(27):952-956; 1977.

Samples of gastric contents were taken from 152 patients with gastroduodenal reflux after an overnight fast and examined for hemolytic activity and lysolecithin content. The hemolysis tests were positive in 97/152 cases: in 13/29 patients with normal mucosa, in 13/20 patients with reflux esophagitis, in 33/49 patients with gastric ulcer, in 10/12 patients with gastric erosion, in 15/25 patients with superficial gastritis, and in 13/17 patients with chronic atrophic gastritis with intestinal metaplasia. Eighty-eight of the positive samples were analyzed by thin-layer chromatography for lysolecithin content. Lysolecithin was not found in nine samples. The lysolecithin levels averaged 41.5 mg/100 ml in 13 patients with normal gastric mucosa, 28.5 mg/100 ml in 9 patients with reflux esophagitis, 19.7 mg/100 ml in 26 patients with gastric ulcer, 38.4 mg/100 ml in 8 patients with gastric erosion, 61.3 mg/100 ml in 13 patients with superficial gastritis, and 43.6 mg/100 ml in 10 patients with chronic atrophic gastritis with intestinal metaplasia. The lysolecithin levels found in patients without gastroduodenal reflux in previous investigations averaged 0.9 mg/100 ml. The pH value of the gastric contents, ranged from 1.1 to 7.8 and did not correlate with the lysolecithin level or the result of the hemolysis test, nor was there any correlation between the lysolecithin level and bilirubin level. Along with data in the literature, these findings indicate that lysolecithin may exert a pathogenic effect in the development of various gastric lesions.

1180 LOCATION OF ULCER IN THE STOMACH AND PYLOROANTRAL HYPERTROPHY: CORRELATION BETWEEN THE SITE OF ULCER AND GASTRIC WALL HYPERTROPHY IN GASTRIC ULCER. (Ger.) Liebermann-Meffert, D.; Allgower, M. (Chirurg. Dept., Kantonsspital Basel, CH-4004 Basel, Switzerland). *Z. Gastroenterol.* 14(6):613-619; 1976.

Relationships between the localization of gastric ulcer and hypertrophy of the pyloroantral wall (musculature + submucosa + mucosa) were studied in a random series of 77 resected specimens with solitary (60) and multiple (40) gastric ulcers. Sixty-three ulcers were localized to the lesser curvature, 29 to the posterior wall, 6 to the anterior wall, and 2 to the greater curvature. No difference was found between solitary and multiple ulcers in terms of their localization, but ulcers localized to the posterior wall were more frequent in men than in women. Most of the 100 ulcers were at distances of up to 90 mm from the pylorus. The distance between solitary ulcers and the pylorus was usually 20-60 mm, that between multiple ulcers and the pylorus, 0-40 mm. The distance was about 60 mm in most cases, with some difference between men and women in this respect. No significant correlation was found between the distance of solitary and multiple ulcers from the pylorus and the hypertrophy of the entire pyloroantral wall, but the musculature was significantly less hypertrophied in the case of solitary ulcers further from the pylorus, and significantly more hypertrophied in the case of multiple ulcers further from the pylorus compared to the cases of ulcers closer to the pylorus ($p<0.02$).

1181 CASES OF BENIGN STOMACH TUMOURS. (Ita.) Pozzoli, P. (Ospedale Civile, 1 via Felice Villa, I-22066 Mariano Comense, Como, Italy). *Radiol Med. (Torino)* 63(1):49-62; 1977.

1182 GASTRIC LYMPHOMA AND PSEUDOLYMPHOMA. (Spa. Larrauri, J.; Patron, M.; Contreras, F.; Rios, M. J.; Gamallo, C. (Departamento de Anatomia Patologica, Ciudad Sanitaria "La Paz," Madrid, Spain) *Rev. Esp. Enferm. Apar. Dig.* 49(2):175-188; 1977.

1183 PSEUDOLYMPHOMAS OF THE STOMACH. (Rus.) Postolov, P. M.; Baido, V. P.; Berezovskaya E. K.; Petrova, T. N. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (2):93-95; 1977.

1184 CLINICAL PICTURE AND ROENTGENOLOGICAL SEMIOTICS OF GASTRIC PSEUDOLYMPHOMATOSIS. (Rus.) Shusterov, B. G.; Salyukov, Yu. L.; Rozenberg, V. A.; Maltsev, N. I.; Shusterova, I. B.; Dobrovolsky, B. V.; *et al.* (M. I. Kalinin Omsk Medical Inst., Omsk, USSR). *Sov. Med.* (8):100-104; 1976.

1185 COMPUTER-ASSISTED DIAGNOSIS OF DYSPEPSIA--REPORT ON TRANSFERABILITY OF A SYSTEM, WITH EMPHASIS ON EARLY DIAGNOSIS OF GASTRIC CANCER. (Eng.) Zoltie, N.; Horrocks, J. C.; De Dombal, F. T. (Univ. Bristol, Bristol, England). *Methods Inf. Med.* 16(2):89-92; 1977.

1186 "EARLY GASTRIC CARCINOMA:" BEGINNING GASTRIC CANCER? SUPERFICIAL CANCER OF THE STOMACH? THE PROBLEM OF ITS EARLY DETECTION. (Fre.) Potet, F. (Hopital Beaujon, F 92118 Clichy Cedex, France). *Gastroenterol. Clin. Biol.* 1(4):313-318; 1977.

1187 DIFFUSE SUBMUCOSAL CYSTS ON THE STOMACH AS PROBABLE PRECANCEROUS LESION. (Jpn.) Iwanaga, T.; Koyama, H.; Furukawa, H.; Taniguchi, H. (Osaka Municipal Adult Disease Center, Osaka, Japan) *Jpn. J. Gastroenterol.* 73(1):31-40; 1976.

1188 CLINICAL AND RADIOLOGICAL REMARKS ON 5 CASES OF JUXTACARDIAL DIVERTICULA OF THE STOMACH. (Ita.) Trecate, F. F.; Scaravelli, C. (Ospedale G. Salvini, I-20020 Garbagnate Milanese, Milan, Italy). *Radiol. Med. (Torino)* 63(1):63-67; 1977.

1189 DOUBLE PYLORUS. (Spa.) Garijo Forcada, J. M.; Carballal Lugris, M.; Otero Portela, J. L. (Residencia Sanitaria de la Seguridad "Monticelo," Pontevedra, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(2):177-180; 1977.

1190 SOME PROBLEMS OF PATHOGENESIS AND CLINICAL PICTURE OF THE DUMPING SYNDROME. (Rus.) Bulgakov, G. A. (A. V. Vishnevskii Inst. Surgery, Moscow, USSR). *Klin. Med. (Mosk.)* 54(8):119-123; 1976.

1191 DYNAMICS OF GASTRIC MUCOSA DYSPLASIA. (Hun.) Luzsa, Gy.; Szabo, Zs.; Pollag, E. (Mosonmagyarovari Varosi Tanacs Korhaza, Rontgenosztaly, Mosonmagyarovar, Hungary). *Orv. Hetil.* 118(14):799-802; 1977.

1192 ON ACUTE GASTRECTASIA. (Rus.) Minin, V. V.; Anishin, N. S. (Donetsk Medical Inst., Donetsk, USSR). *Vestn. Khir.* 116(8):14-16; 1976.

1193 GASTRITIS--CAUSES AND CONSEQUENCES. (Ger.) Heilmann, K. (Pathol.-Bakteriol. Instituts des Stadtischen Krankenhauses, 7530 Pforzheim, W. Germany). *Fortschr. Med.* 94(32):1879-1884; 1976.

1194 SOME HORMONAL FACTORS IN CHRONIC GASTRITIS. (Rus.) Martynets, P. A. (Municipal Hosp. No. 6, Krivoi Rog, USSR). *Ter. Arkh.* 49(2):41-43; 1977.

1195 HISTOCHEMICAL STUDY OF MUCOPOLYSACCHARIDES OF THE FUNDIC MUCOSA IN THE COURSE OF NONSPECIFIC CHRONIC GASTRITIS. (Ita.) Molinari, F. (Ospedale S. Martino, Genoa, Italy). *Minerva Gastroenterol.* 23(1):43-44; 1977.

1196 GASTRIN CONTENT IN THE BLOOD SERUM OF CHILDREN WITH PRIMARY GASTRODUODENITIS. (Rus.) Mazurin, A. V.; Zubovsky, G. A.; Miroshnichenko, A. V.; Markova, E. G. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (2):26-29; 1977.

1197 MAST CELLS AND PHYSIOLOGICAL INFLAMMATION OF THE GASTRIC MUCOSA. (Rus.) Uspensky, V. M. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Ter. Arkh.* 49(2):21-24; 1977.

1198 SOME INDICES OF PROTEIN METABOLISM IN PATIENTS WITH GASTRIC IRON-DEFICIENCY ANEMIA. (Rus.) Mokhun, I. K.; Lukianchuk, D. G.; Voronova, L. F. (Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* (1):19-22; 1977.

1199 CHANGES OF GASTRIC MOTILITY IN SURGICAL TREATMENT OF HERNIAS AND RELAXATION OF LEFT CUPOLA OF THE DIAPHRAGM. (Rus.) Grintsov, A. G. (Donetsk Medical Inst., Donetsk, USSR). *Klin. Khir.* (8):86; 1977.

1200 PRIMARY GASTRIC FORMS OF HODGKIN'S DISEASE. (Fre.) Leymarios, J.; Martin, E.; Marche, Cl.; Vissuzaine, Ch.; Debray, Ch. (Hopital Bichat, 170, boulevard Ney, F 75877 Paris Cedex 18, France). *Ann. Med. Interne (Paris)* 128(6/7):549-551; 1977.

See also, 0854, 0861, 0862, 1020, 1057, 1060, 1067, 1068, 1079, 1082, 1090, 1096, 1102, 1109, 1121, 1122, 1123, 1124, 1125, 1150, 1155, 1157, 1158, 1169, 1202, 1203, 1205, 1206, 1208, 1210, 1212, 1214, 1217, 1219, 1220, 1221, 1250, 1253, 1605, 1622, 1633, 1645, 1652, 1657.

STOMACH

Peptic Ulcers

1201 PERFORATION OF CHRONIC PEPTIC ULCERS AFTER CIMETIDINE. (Eng.) Wallace, W. A.; Orr, C. M. E.; Bearn, A. R. (Queen Elizabeth Hosp., Sheriff Hill, Gateshead NE9 6SX, England). *Br. Med. J.* 2(6091):865-866; 1977.

Three cases of chronic peptic ulcer perforation in which abrupt cessation of cimetidine treatment may have been the cause are reported. Perforation of a duodenal ulcer in the first patient occurred 5 days after he had completed a 6-week course of cimetidine (200 mg thrice daily plus 400 mg at night). The second patient's perforation occurred 10 days after he had completed a 4-week course of cimetidine (200 mg thrice daily plus 400 mg at night) for gastric ulcer, and perforation in the third patient occurred 10 days after she had completed a 6-week course (same dose regimen) for duodenal ulcer. The treatment resulted in relief of symptoms in the two patients with duodenal ulcer but not in the patient with gastric ulcer. All three patients were prescribed cimetidine by their general practitioners and had no pretreatment investigation and no subsequent investigation planned to confirm ulcer healing; the possibility that gastric cancer was present was therefore not excluded. In all patients, the large size of the perforation resulted in moderate to gross contamination of the peritoneal cavity, which precluded definitive ulcer surgery in two patients. The perforations may have occurred because of rebound hyperacidity after cimetidine had been stopped or because the partially healed chronic ulcer, which had responded to cimetidine, may have been less resistant to perforation when exposed to the normal acid concentrations after cimetidine had been stopped.

1202 STUDY OF 400 FAMILIES WITH INCREASED INCIDENCE OF GASTRODUODENAL ULCER. DEDUCTIONS CONCERING THE PATHOGENESIS OF ULCER. (Fre.) Dubarry, J. J. (Hopital Saint-Andre, 1, rue Jean-Burguet, 33000 Bordeaux, France). *Rev. Fr. Gastroenterol.* 128:57-61; 1977.

1203 GASTRIC AND DUODENAL ULCER: A TOPIC OF CLINICAL RESEARCH. (Ger.) Creutzfeldt, W. (Medizinische Klinik und Poliklinik, Humboldtallee 1, 3400 Gottingen, W. Germany). *Naturwiss. Rundsch.* 30(3):73-82; 1977.

1204 ETIOLOGY AND PATHOGENESIS OF PEPTIC ULCER. (Rus.) Gadzhiev, A. S.; Mukhordov, A. G. (Kemerovo Medical Inst., Kemorovo, USSR). *Klin. Med. (Mosk.)* 55(4):52-57;1977.

1205 EXPERIMENTAL STUDY ON THE PATHOGENESIS OF ANSTOMOTIC ULCERS. (Ger.) Dahm, K.; Knipper, A.; Eichfuss, H. P.; Werner, B.; Breucker, H. (Chirurgische Universitatsklinik, Martinstr. 52, 2000 Hamburg 20, W. Germany). *Dtsch. Med. Wochenschr.* 101(51):1883-1884; 1976.

1206 TOPOGRAPHY OF CHANGES IN THE MUCOSA OF THE GASTRO-DUODENAL REGION IN CHRONIC GASTRITIS AND ULCERATIVE DISEASE. (Rus.) Pruglo, Yu. V. (Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Arkh. Patol.* 38(11):50-59; 1976.

1207 CHANGES IN AGGRESSIVE PROPERTIES OF GASTRIC JUICE IN PEPTIC ULCER. (Rus.) Gadzhiev, Kh. E.; Akhlakova, A. A. (Dagestan Medical Inst., Dagestan, USSR). *Ter. Arkh.* 49(2):29-32; 1977.

1208 ULTRASTRUCTURAL CHANGES IN GASTRIC MUCOSAL CELLS IN PRECULCEROUS CONDITION OF DUODENAL ULCER. (Rus.) Degtyareva, I. I. (Kiev Medical Inst., Kiev, USSR). *Ter. Arkh.* 49(2):25-29; 1977.

1209 THE LEVEL OF POLYSACCHARIDE-PROTEIN COMPONENTS OF GASTRIC JUICE IN THE ASSESSMENT OF SEVERITY OF DUODENAL ULCER. (Rus.) Fedyshin, P. S.; Vershinskaya, N. V.; Tarasyuk, K. A. (Kiev Inst. Advanced Medical Studies, Kiev, USSR). *Ter. Arkh.* 49(2):19-21; 1977.

1210 EPITHELIAL FORMULA AND RELATIONSHIP BETWEEN CHIEF AND PARIETAL CELLS OF THE FUNDIC GLANDS OF THE STOMACH IN PEPTIC STOMACH AND DUODENAL ULCER. (Rus.) Samsonov, V. A.; Azarenko, V. V. (Dept. Pathologic Anatomy and Forensic Medicine, O. V. Kuusinen Petrozavodsk Univ., Petrozavodsk, USSR). *Arkh. Patol.* 39(4):62-67; 1977.

1211 FUCOGLYCOPROTEINS IN VARIOUS BIOLOGICAL FLUIDS OF THE RELATIVES OF PATIENTS WITH ULCEROUS DISEASE. (Rus.) Rabinovich, P. D.; Domracheva, N. I. (Medical Sch., Chita, USSR). *Vopr. Med. Khim.* 23(4):478-482; 1977.

1212 ALTERATIONS IN BILE PASSAGES IN DIFFERENT PHASES OF ULCEROUS DISEASE BEFORE AND AFTER GASTRIC RESECTION. (Rus.) Shamlyan, A. P. (S. M. Kirov Leningrad Inst. Advanced Medical Studies, Leningrad, USSR). *Vestn. Khir.* 118(2):16-19; 1977.

1213 THE ROLE OF SEX HORMONES IN PEPTIC ULCERATION AND GASTROINTESTINAL FUNCTION. (Ger.) Shearin, N.; Pfeiffer, C. J. (Faculty Medicine, Memorial Univ. Newfoundland, St. John's, Newfoundland, Canada). *Leber Magen Darm* 6(3):141-145; 1976.

1214 HISTOTOPOCHEMISTRY OF MUCIN IN THE NORMAL GASTRIC MUCOSA AND IN GASTRITIS. RELATIONSHIPS WITH PEPTIC ULCER. (Ger.) Engel, C.; Bergmann, M. (Pathologisches Institut des Bereichs Medizin der Friedrich-Schiller-Universitat Ziegenmuhlenweg 1, DDR-69 Jena, E. Germany). *Dtsch. Gesundheitsw.* 32 (8):358-363; 1977.

1215 PERFORATED GASTRODUODENAL ULCERS IN FEMALES. (Rus.) Ponomarev, A. A. (Surgical Clinic, Ryazan Medical Inst., Ryazan, USSR). *Khirurgiia (Mosk.)* (4):75-78; 1977.

1216 FUNCTIONAL MORPHOLOGY OF THE SMALL INTESTINE IN CONDITIONS OF THE DUMPING SYNDROME.

(Rus.) Kostromin, A [illegible]. Sayenko, V. F.; Silchenko, V. P. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (4):49-53: 1977.

1217 CONCOMITANCE OF PULMONARY TUBERCULOSIS AND GASTRIC AND DUODENAL ULCER. (Rus.) Goldshtein, V. D.; Tovarkova, N. A.; Androsov, E. E.; Livergrant, A. E. (Central Inst. Advanced Medical Studies, Moscow, USSR). *Ter. Arkh.* 49(2):95-99; 1977.

1218 TREATMENT OF GASTRIC AND DUODENAL ULCER WITH METRONIDASOL. (Rus.) Gavrilenko, Yu. V.; Vazilo, V. E.; Parshkov, E. M.; Pichugin, Yu. T.; Skornetsky, B. D.; Slepynin, V. I.; Chibis, O. A. (P. V. Mandryk Central Military Hosp., Moscow, USSR). *Ter. Arkh.* 48(5):74-79; 1976.

1219 EVALUATION OF LONG-TERM TOLERANCE OF TRITHIOZINE (ISF 2001). (Ita.) Corinaldesi, R.; Luchetta, L.; Ricci, P.; Casadio, R.; Fabbri, R.; Abbondati, G.; Barbara, L. (Istituto di Gastroenterologia dell'Universita di Bologna, Bologna, Italy). *Farmaco [Prat.]* 32(1):25-31; 1977.

1220 PEPTIC ULCERS OF INTESTINAL GRAFTS FOLLOWING PRIMARY AND RECONSTRUCTIVE GASTROJEJUNOPLASTY. (Rus.) Kazimirov, L. I. (Gorki Medical Inst., Gorki, USSR). *Khirurgiia (Mosk)* 4:82-86; 1977.

1221 EARLY GASTRIC ULCER AFTER HYPERSELECTIVE VAGOTOMY FOR DUODENAL ULCER. (Fre.) Cuilleret, J.; Etaix, J. P.; Picq, P.; Barthelemy, C.; Colas, M.; Fraisse, H. (C.H.U. Saint-Etienne, 30, rue de Ferdinand Cambon, F 42100 Saint-Etienne, France). *Nouv. Presse Med.* 6(21):1843-1845; 1977.

1222 DISTURBANCES IN THE LIVER FUNCTION DUE TO VAGOTOMY. (Pol.) Lewicki, K. (II Klinika Chirurgii Ogolnej Instytutu Chirurgii AM, ul. Prof. Kieturakisa 1, 80-742 Gdansk, Poland). *Pol. Przegl. Chir.* 49(5):549-554; 1977.

See also, 0852, 1105, 1124, 1630, 1652.

SMALL INTESTINE

1223 INFLUENCE OF SMALL INTESTINAL SHUNT AND SMALL INTESTINAL RESECTION ON GASTRIN RELEASE. (Ger.) Wedell, J.; Fritsch, W. P.; Hausamen, T. U. (Chirurg. Abteilung, Kreiskrankenhauses Herford, 4900 Herford, W. Germany). *Z. Gastroenterol.* 14(6):620-625; 1976.

Gastric acid secretion and serum gastrin levels were studied in 10 normal subjects with normal body weight (group 1), in 7 patients who had undergone jejunoileal bypass surgery for excessive obesity 14 months earlier (group 2), and in 3 patients (group 3) who had undergone subtotal small intestinal resection for infarction 1-36 months earlier. Normal gastric acid secretion was found in groups 1 and 2, and the secretion was at the lower limit of the normal range in group 3. There was no significant difference in the fasting serum gastrin levels between groups 1 and 2, but significantly increased fasting serum gastrin levels were found in group 3. Increase in the serum gastrin level was seen in group 1 during the first 2 hr following the administration of a test meal (100 g of homogenized, low-fat raw meat), but no significant change was seen in group 2 (the serum gastrin level showed no change in 3 patients, and marked gastrin release was seen in the other 4). The serum gastrin level was significantly higher in group 3 than it was in group 1 ($p<0.0005$). The hypergastrinemia seen in group 3 after the test meal may be due to the reduced breakdown of gastrin.

1224 THE IMMUNOLOGIC SYSTEM, IMMUNOLOGIC DEFICIENCY DISORDERS AND LYMPHOID HYPERPLASIA OF THE SMALL INTESTINE. (Eng.) Koch, C. T. (Univ. Hosp., Leiden, Netherlands). *Radiol. Clin. (Basel)* 45(2/4):165-174; 1976.

1225 DISTURBANCES OF THE DUODENAL PASSAGE IN THE NEWBORN. (Ger.) Medrano, J. (Univ. Klin., Gesamthochsch. Essen, W. Germany). *Z. Kinderchir.* 18(4):348-357; 1976.

1226 THE NATURAL HISTORY OF MECKEL'S DIVERTICULUM AND ITS RELATION TO INCIDENTAL REMOVAL. A STUDY OF 202 CASES OF DISEASED MECKEL'S DIVERTICULUM FOUND IN KING COUNTY, WASHINGTON, OVER A FIFTEEN YEAR PERIOD [Abstract]. (Eng.) Soltero, M. J.; Bill, A. H. (Children's Orthopedic Hosp., Seattle, WA 98105). *Am. J. Surg.* 132(2):168-173; 1976.

1227 ANGIOGRAPHIC DEMONSTRATION OF A DUODENAL CARCINOID [Abstract]. (Eng.) Mackintosh, C. E.; Newman, J. (Royal Free Hosp., London, England). *J. R. Coll. Surg. Edinb.* 21(4):233-236; 1976.

1228 BIOPSY EVIDENCE OF HYPERPLASIA OF BRUNNER'S GLANDS [Abstract]. (Eng.) Maratka, Z.;

Kocianova, J.; Jirko, P.; Kudrmann, J. (Hosp. Bulovka, Prague, Czechoslovakia). *Gut* 18(11):A984; 1977.

1229 ARTERIOVENOUS MALFORMATION OF THE JEJUNUM [Letter to Editor]. (Eng.) Gagic, N.; Thurlow, W. (Henderson General Hosp., Hamilton, Ontario, Canada). *Can. Med. Assoc. J.* 117(7): 729-731; 1977.

1230 GASTRIN CELLS IN MECKEL'S DIVERTICULUM [Letter to Editor]. (Eng.) Capron, J. P.; Dupas, J. L.; Marti, R.; Descombes, P.; Potet, F. (Centre Hospitalier Universitaire, Amiens 80030, France). *N. Engl. J. Med.* 297(20):1126; 1977.

1231 ENDOSCOPIC-RADIOLOGIC EMERGENCY DIAGNOSIS IN BLEEDING FROM THE PAPILLA OF VATER AND FROM BILIODIGESTIVE ANASTOMOSES [Abstract]. (Eng.) Paul, F.; Huchzermeyer, H.; Mellmann, J. (Zentrum f. Innere Med., Justus-Liebig-Univ., Giessen, W. Germany). *Endoscopy* 9(3):190; 1977.

1232 DISEASES OF GENITO-URINARY TRACT ASSOCIATED TO MALFORMATION OF THE UPPER DIGESTIVE TRACT AND EXTRA-HEPATIC BILIARY TRACT [Abstract]. (Eng.) Goldraich, N. P.; Kilpp, J. C.; Koff, W.; Pranke, M. L.; Montenegro, T. S. (No affiliation given). *Arq. Gastroenterol.* 14(3):162; 1977.

1233 NATAL TEETH, PATENT DUCTUS ARTERIOSUS AND INTESTINAL PSEUDO OBSTRUCTION: A LETHAL SYNDROME IN THE NEWBORN. (Eng.) Harris, D. J.; Ashcraft, K. W.; Beatty, E. C.; *et al.* (Children's Mercy Hosp., Kansas City, MO). *Clin. Genet.* 9(5):479-482; 1976.

1234 RAPID HPLC ANALYSIS OF CONJUGATED BILE ACIDS FROM HUMAN BILE [Abstract]. (Eng.) Shaw, R.; Smith, J. A.; Elliott, W. H. (St. Louis Univ. Sch. Medicine, St. Louis, MO 63104). *Gastroenterology* 73(5):1246; 1977.

1235 ABSORPTION OF DIFFERENT ELEMENTAL DIETS IN A SHORT BOWEL SYNDROME LASTING 15 YEARS. (Eng.) Simko, V.; Linscheer, W. G. (State Univ. New York Upstate Medical Center, Syracuse, NY). *Am. J. Dig. Dis.* 21(5):419-425; 1976.

1236 DIGESTIVE TRACT HEMORRHAGE DUE TO INTESTINAL ANGIOMATOSIS. (Ita.) Cordone, G.; Bertolini, A.; Gemme, G. (Clinica Pediatrica "G. Gaslini" dell'Universita di Genova, Genoa, Italy). *Minerva Pediatr.* 29(9):617-620; 1977.

1237 JEJUNAL ATRESIA. WRONG DIAGNOSIS: HIRSCHSPRUNGS'S DISEASE. (Ger.) Troger, J. (Universitatsklinik-Kinderklinik Mainz, Langenbeckstrasse 1, 6500 Mainz, W. Germany). *Z. Kinderchir.* 21(2):193-195; 1977.

1238 SURGICAL MANAGEMENT OF INTESTINAL BLEEDING. (Ger.) Farthmann, E. H.; Eichen, R. (Chirurgische Universitatsklinik, D-6650 Homburg/Saar, W. Germany). *Chirurg* 48(4):219-226; 1977.

1239 RADIOLOGICAL DIAGNOSIS OF GRANULOMATOUS AND NEOPLASTIC DISEASES OF THE SMALL INTESTINE. (Ita.) Monti, C.; Malagola, C.; Baraldi, G. P.; Ermini, G.; Mattei, M. (No affiliation given). *Bull. Sci. Med.* 149(1):39-44; 1977.

1240 MALIGNANT NEUROMA OF THE SMALL INTESTINE. (Ger.) Jakesz, R.; Keminger, K.; Roka, R. (I. Chirurgische Universitatsklinik, Alserstrasse 4, A-1090 Vienna, Austria). *Zentralbl. Chir.* 102 (4):252-254; 1977.

1241 ROENTGENOLOGICAL CHARACTERISTICS OF DYSKINESIA OF THE DUODENUM IN CHILDREN. (Rus.) Filippkin, M. A. (Central Inst. Postgraduate Medical Studies, Moscow, USSR). *Pediatriia* (3):40-46; 1977.

1242 PRIMARY HODGKIN'S SARCOMA OF THE SMALL INTESTINE IN SPRUE SYNDROME WITH STEATORRHEA. (Ger.) Schwerk, W.; Braun, B.; Boger, A.; Schmitz-Moormann, P. (Medizinische Universitatsklinik Mannkopffstrasse 1, D-3550 Marburg/Lahn, W. Germany). *Z. Gastroenterol.* 15(4):240-245; 1977.

1243 PNEUMATOSIS CYSTOIDES INTESTINALIS: A DISEASE OF UNKNOWN ETIOLOGY. (Dut.) Saltet, J. F. (No affiliation given). *Ned. Tidschr. Geneeskd.* 121(27):1106-1107; 1977.

1244 INTUSSUSCEPTION IN SCHONLEIN-HENOCH PURPURA. (Ita.) Violante, N.; De Vanna, C.; Falcone, G. (Istituto di Clinica Pediatrica dell' Universita di Bari, Bari, Italy). *Minerva Pediatr.* 29(9):633-635; 1977.

1245 TREATMENT OF ACUTE COMMISSURAL ILEUS. (Rus.) Zakharova, G. N.; Myshkin, K. I.; Frankfurt, L. A.; Gorfinkel, I. V. (Saratov Medical Inst., Saratov, USSR). *Sov. Med.* (3):69-73; 1977.

1246 TREATMENT OF PARALYTIC ILEUS WITH ALPHA- AND BETA-LYTIC DRUGS. (Ita.) Leonardis, G.; Ciammitti, B.; Splendiani, G. (Cattedra di Rianimazione dell'Istituto Universitario di Medicina e Chirurgia, L'Aquila, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(14):1098-1103; 1976.

1247 INTESTINAL PSEUDO-OBSTRUCTION. (Ger.) Massarrat, S.; Schneider, J.; Seidel, W.; Schmitz-Moormann, P.; Dombrowski, H. (Medizinischen Universitatspoliklinik, Emil-Mannkopff-Strasse, D-3550 Marburg, W. Germany). *Z. Gastroenterol.* 15(5):300-310; 1977.

1248 POLYPS OF LARGE DUODENAL PAPILLA. (Rus.) Vinogradov, V. V.; Bazilevich, F. V. (Dept. Surgery, Patrice Lumumba Univ., Moscow, USSR). *Vestn. Khir.* 118(3):46-50; 1977.

1249 ENDOSCOPIC SPLITTING OF STENOSIS AT THE URETER-ILEUM ANASTOMOSIS IN ILEUM CONDUIT. REPORT OF A CASE. (Ger.) Leisinger, H. J.; Deyhle, P. (Urologische Universitatsklinik, Kantonsspital Zurich, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Helv. Chir. Acta* 44(3):397-401; 1977.

1250 SEVERE DILATION OF THE STOMACH AND DUODENUM AS A CONSEQUENCE OF INBORN SMALL INTESTINAL STENOSIS IN A 13-YEAR-OLD CHILD. (Ger.) Harzheim, I. (Kinderradiologie, Radiologische Klinik Cottbus, DDR-75 Cottbus, E. Germany). *Radiol. Diagn. (Berl.)* 18(2):185-186; 1977.

1251 X-RAY DIAGNOSIS OF COMPLICATIONS FOLLOWING RESECTION OF THE SMALL INTESTINE. (Rus.) Sipukhin, Ya. M.; Baranova, A. E. (Vladivostok Medical Inst., Vladivostok, USSR). *Vestn. Rentgenol. Radiol.* (2):25-32; 1977.

1252 WATER AND SODIUM TRANSPORT IN ALCOHOLICS [Letter to Editor]. (Eng.) Halsted, C. H.; Mekhjian, H. S. (Sch. Medicine, TB 171, Univ. California, Davis, CA 95616). *Gastroenterology* 73(5):1187-1188; 1977.

1253 FUNCTIONAL AND MORPHOLOGIC EXAMINATION OF THE JEJUNAL REPLACEMENT STOMACH [Abstract]. (Eng./Ger.) Brunner, H.; Kempf, P. (Chirurgische Universitatsklinik, Langenbeckstrasse 1, D-6500 Mainz, W. Germany). *Langenbecks Arch. Chir.* 345:595-596; 1977.

1254 CHANGES IN GUT-RELATED HORMONES IN OBESE PATIENTS DURING WEIGHT LOSS INDUCED BY DIET OR BY INTESTINAL BYPASS [Abstract]. (Eng.) Dahms, W. T.; Atkinson, R. L.; Frame, C.; Taylor, I.; Bray, G. A. (Univ. California at Los Angeles, Sch. Medicine, Los Angeles, CA). *Clin. Res.* 26(2):109A; 1978.

1255 LESIONS ASSOCIATED WITH PEUTZ-JEGHERS SYNDROME AND SO-CALLED FAMILIAL POLYPOSIS COLI [Abstract]. (Eng.) Ushio, K. (Natl. Cancer Center Hosp., Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):330; 1977.

1256 EARLY DIAGNOSIS OF BOWEL AND PANCREATIC INJURIES IN BLUNT ABDOMINAL TRAUMA [Abstract]. (Eng./Ger.) Ruckert, K.; Loth, R. (Chirurgische Universitatsklinik, Langenbeckstr. 1, D-6500 Mainz, W. Germany). *Langenbecks Arch. Chir.* 345:586; 1977.

1257 METRONIDAZOLE IN THE TREATMENT OF BYPASS ENTERITIS [Abstract]. (Eng.) Solhaug, J. H. (Hosp. Torsby, Torsby, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):100; 1977.

1258 SUPERIOR MESENTERIC ARTERY SYNDROME. A REPORT ON FOUR OPERATED CASES [Abstract]. (Eng.) Lukes, P.; Rolny, P.; Nilson, A. E.; Gamklou, R.; Darle, N.; Dotevall, G. (Sahlgren Hosp., Univ. Gothenburg, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):57; 1977.

1259 DIET AND INTESTINAL DISEASE [Abstract]. (Eng.) Jones, F. A. (St. Mark's Hosp., London, England). *Nutr. Rep. Int.* 16(4):530; 1977.

1260 MORPHOLOGICAL AND CLINICAL FEATURES OF LATE ONSET LIVER DISEASE FOLLOWING JEJUNOILEAL BYPASS FOR OBESITY [Abstract]. (Eng.) Scott, L. D. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 73(5):1245; 1977.

See also, 1044, 1050, 1072, 1074, 1080, 1082, 1083, 1085, 1086, 1088, 1090, 1104, 1109, 1121, 1123, 1143, 1202, 1206, 1216, 1220, 1221, 1264, 1268, 1270, 1271, 1298, 1317, 1321, 1322, 1339, 1359, 1567, 1591, 1605, 1610, 1621, 1629, 1632, 1633, 1638, 1643, 1645, 1649, 1652, 1657, 1658, 1661, 1662, 1665, 1673.

SMALL INTESTINE

Malabsorption

1261 IMMUNOGLOBULINS IN JEJUNAL MUCOSA AND SERUM FROM PATIENTS WITH ADULT COELIAC DISEASE. (Eng.) Baklien, K.; Brandtzaeg, P.; Fausa, O. (Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(2):149-159; 1977.

Ig-containing cells were quantitated immunohistochemically in biopsy specimens from the proximal jejunal mucosa of controls and patients with celiac disease (CD). The numbers of IgA, IgM, and IgG immunocytes in a defined "mucosal tissue unit" were, on the average, raised 2.4, 4.6, and 6.5 times, resp., when 13 adult patients with untreated CD were compared with 15 patients who had a histologically normal mucosa. The IgA:IgM:IgG cell ratios averaged 66:28:6 in untreated CD and 79:18:2.6 in the controls. Similar quantitative data in 10 patients with treated CD were intermediate. IgD- and IgE-containing cells were rare in all patient groups. Most patients in a heterogeneous malabsorption group showed a jejunal Ig-containing cell population similar to that seen in CD, indicating that the local immunocyte pattern may not be specific for the latter disease. The only significant alteration in serum Ig levels related to CD was a raised concentration of IgA compared with normal. This was consistent with the increased amounts of extracellular IgA revealed in the mucosa. However, there was no indication of a defect in the transport of dimeric IgA and IgM through secretory component-producing cells, which in the CD mucosa were present in both crypt and surface epithelium.

1262 IgA CLASS RETICULIN ANTIBODIES IN RELATIVES OF PATIENTS WITH COELIAC DISEASE. (Eng.)

Mallas, E. G.; Williamson, N.; Cooper, B. T.; Cooke, W. T. (General Hosp., Birmingham, England). *Gut* 18(8):647-650; 1977.

Patients with various gastrointestinal diseases, patients with celiac disease, and relatives of patients with celiac disease were investigated for IgA class reticulin antibodies, using monospecific anti-IgA and IgG antisera. IgA class reticulin antibodies were not found in any of 19 patients with Crohn's disease, 22 with ulcerative colitis, or 19 with hiatal hernia despite a significant incidence of IgG class reticulin antibodies. None of 56 normal healthy subjects was positive. In contrast, 13 (76%) of the sera from 17 patients with celiac disease on normal diet were positive for IgA class antibodies as were 19 (20%) of 93 first-degree relatives. Seventy-three relatives underwent jejunal biopsy. Grade III (flat) histology was found in 13 and, of these patients, 10 (77%) showed IgA class reticulin antibody in their serum. Determination of IgA class reticulin antibodies is a useful test to determine which relative must be biopsied.

1263 COELIAC DISEASE: THE ABOLITION OF GLIADIN TOXICITY BY ENZYMES FROM Aspergillus niger. (Eng.)

Phelan, J. J.; Stevens, F. M.; McNicholl, B.; Fottrell, P. F.; McCarthy, C. F. (Dept. Biochemistry, Univ. Coll., Galway, Ireland). *Clin. Sci. Mol. Med.* 53(1):35-43; 1977.

Xylose absorption, mucosal morphology, and brush border enzymes were studied in patients with celiac disease who ingested carbohydrate-free gliadin, to determine whether the toxicity of gliadin in these patients involves its carbohydrate components. Carbohydrate was removed from dialyzed gliadin by dissolving 50 g in acetic acid, adjusting the pH to 4.5, and adding a mixture of carbohydrases prepared from *Aspergillus niger*. Proteolytic activity was negligible. The gliadin was dialyzed, freeze-dried, and baked into 450-g loaves of bread with gluten-free flour. Three patients in remission each received five loaves of this bread, while a fourth received bread containing untreated gliadin. Only this latter patient showed a definite impairment in xylose absorption. The small intestinal morphology, including villus height, crypt depth, epithelial cell height, and the presence or absence of inflammatory cells in the epithelium and lamina propria, showed no change in the three patients who received enzyme-treated gliadin, while the epithelial cell height and the number of intraepithelial lymphocytes decreased and increased, resp., in the patient who received untreated gliadin. Only this patient showed decreases in all enzymes studied (alkaline phosphatase, lactase, and sucrase). The patient receiving untreated gliadin also had diarrhea, whereas the other three patients did not. The results suggest that carbohydrases present in the microbial extract of *A. niger* are responsible for detoxifying gliadin; however, until a complete characterization of the enzymes involved has been made, the possibility remains that a side-chain substituent other than carbohydrate may account for the toxicity of gliadin.

1264 ACTIVATION OF THE ALTERNATIVE PATHWAY BY GLUTEN: A POSSIBLE AETIOLOGICAL FACTOR IN DERMATITIS HERPETIFORMIS. (Eng.)

Massey, A.; Capner, P. M.; Mowbray, J. F. (St. Mary's Hosp. Medical Sch., London, England). *Immunology* 33(3): 339-342; 1977.

Experiments were carried out to determine whether direct activation of the alternative pathway of complement (c) by gluten in the serum is involved in the etiology of dermatitis herpetiformis and celiac disease lesions subsequent to gluten-induced jejunal damage. C3, factor B, and their respective breakdown products were measured by a two-way, antigen-antibody crossed immunoelectrophoresis. In normal serum, there was usually a low level of "spontaneous" C3 conversion. This background level was higher in sera with normal, than in those with reduced, factor B activity. The background was abolished by the presence of EDTA in the incubation mixture. The addition of gluten fractions to normal serum was shown to activate the alternative pathway of complement. C3 and factor B breakdown occurred in a manner analogous to that when activated by zymosan, in the presence of MgEGTA and in serum devoid of classical pathway activity. Bypass activation may be the primary event when gluten enters the serum across a damaged gut mucosa. Immune complexes containing noncomplement-fixing IgA antigluten antibody are carried to the skin, where it is proposed that complexed gluten activates C3 and initiates an inflammatory reaction.

1265 MALABSORPTION SYNDROME, INCLUDING THE CORRELATION WITH THE PANCREATIC DISEASES, WITH PARTICULAR REFERENCE TO THAT WITH ZOLLINGER-ELLISON SYNDROME [Abstract]. (Eng.)

Abe, M. (Keio Univ. Sch. Medicine, Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):324-325; 1977.

1266 REFERENCE OF MORPHOLOGICAL CHANGES OF INTESTINAL VILLI AND DISACCHARIDASE ACTIVITY [Abstract]. (Eng.) Iwaki, K. (Nihon Univ. Sch. Medicine, Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):323; 1977.

1267 PATHOPHYSIOLOGY OF MALABSORPTION SYNDROME [Abstract]. (Eng.) Bamba, T.; Hosoda, S. (Kyoto Prefectural Univ. Medicine, Kyoto, Japan). *Gastroenterol. Jpn.* 12(4):321; 1977.

1268 DYSGAMMAGLOBULINAEMIA AND NODULAR LYMPHOID HYPERPLASIA [Abstract]. (Eng.) Barbieri, D.; Koda, Y. K. L.; Yamazake, S. R.; Pasternak, L.; Gama, A. H.; Quarentei, G. (No affiliation given). *Arq. Gastroenterol.* 14(3):158; 1977.

1269 JEJUNAL BIOPSY IN COW'S MILK PROTEIN INTOLERANCE [Letter to Editor]. (Eng.) Walker-Smith, J. A. (St. Bartholomew's Hosp., London EC1, England). *Lancet* 2(8050):1237; 1977.

1270 RIBOFLAVIN DEFICIENCY IN MALABSORPTIVE STATES [Abstract]. (Eng.) Newman, L. J.; Lopez, R.; Cooperman, J. M. (New York Medical Coll., New York, NY 10029). *Fed. Proc.* 37(3):303; 1978.

1271 BACTERIAL OVERGROWTH WITHOUT 'BLIND LOOP' A CAUSE FOR MALNUTRITION IN THE ELDERLY [Abstract]. (Eng.) Roberts, S. H.; Jarvis, E. H.; James, O. (Newcastle General Hosp., Newcastle, England). *Gut* 18(11):A969; 1977.

1272 DUAL ISOTOPE METHOD OF CLINICAL MEASUREMENT OF FAT ABSORPTION USING TRITIATED GLYCEROL TRIETHER--RESULTS IN 101 SUBJECTS [Abstract]. (Eng.) Mackenzie, J. F.; Nelson, L. M.; Robertson, E.; Russel, R. I. (Royal Infirmary, Glasgow, Scotland). *Gut* 18(11):A962; 1977.

1273 OSTEOPOROSIS, IMPAIRED INTESTINAL CALCIUM ABSORPTION, SECONDARY HYPERPARATHYROIDISM, AND INAPPROPRIATELY LOW SERUM 1,25-DIHYDROXYVITAMIN D VALUE--A SYNDROME [Abstract]? (Eng.) Riggs, B. L.; Gallagher, J. C.; DeLuca, H. F.; Edis, A. J.; Lambert, P. W.; Arnaud, C. D. (Mayo Clinic, Rochester, MN). *Clin. Res.* 25(4):623A; 1977.

1274 ABNORMAL SODIUM AND WATER TRANSPORT IN PERNICIOUS ANEMIA--A LUMINAL DEFECT [Abstract]? (Eng.) Arvanitakis, C.; Folscroft, J. (Kansas Univ. Sch. Medicine, Kansas City, KS). *Clin. Res.* 25(4):569A; 1977.

1275 BILIARY SECRETION OF LIPIDS RELATED TO FECAL STEROIDS IN COELIAC DISEASE [Abstract]. (Eng.) Vuoristo, M.; Tarpila, S.; Miettinen, T. A. (Second Dept. Medicine, Univ. Helsinki, Helsinki, Finland). *Scand. J. Gastroenterol.* 12(Suppl. 45):110; 1977.

See also, 0800, 0804, 1030, 1051, 1083, 1084, 1242, 1252, 1259, 1317, 1632, 1646, 1647, 1650.

LARGE INTESTINE

1276 CHANGES IN SITE DISTRIBUTION OF COLORECTAL CARCINOMA IN CONNECTICUT, 1940-1973. (Eng.) Snyder, D. N.; Heston, J. F.; Meigs, J. W.; Flannery, J. T. (Connecticut Cancer Epidemiology Unit, 30 College St., New Haven, CT 06510). *Am. J. Dig. Dis.* 22(9):791-797; 1977.

Because the proportion of colorectal cancer occurring above the rectosigmoid junction has been increasing over time, the 40,771 cases of colorectal carcinoma reported to the Connecticut Tumor Registry from 1940 through 1973 were analyzed to determine the incidence in the ascending, transverse, descending, and sigmoid colon, and the rectum. The number of cases, the proportion of cases, and incidence rates of cancer in the ascending colon and sigmoid have increased over the 34 yr. The percentage of cases of ascending colon carcinoma between 1940 and 1944 was 13.4%, whereas that between 1970 and 1973 was 21.8%. The increases were greatest among people over 65 yr old. Only about half of colorectal cancer can now be identified with the rigid, 25-cm sigmoidoscope. Other tests must be used for early diagnosis of the increased number of cancers in the upper parts of the colon.

1277 MYOTOMY: SURGICAL TREATMENT OF DIVERTICULITIS. (Ger.) Kyrle, P. (Chirurgische Abteilung, Krankenanstalt Rudolfstiftung, Wahringerstr. 27, A 1090 Vienna IX, Austria). *Zentralbl. Chir.* 102(17):1040-1044; 1977.

Sigmoid myotomy was performed in 36 patients with sigmoid diverticulosis (18 cases) and sigmoid diverticulitis (18 cases). About half of the patients had concurrent diseases, such as diabetes mellitus, cardiovascular diseases with hypotension or hypertension, disorders in peripheral arterial circulation, cholecystitis, and sciatica. The original Reilly operation (transection of the tenia libera of the sigmoid colon to the mucosa) was performed in 34 cases and Hodgson's myotomy (alternating incisions in the tenia libera) in 2 cases. Severe intraoperative and postoperative complications were seen in six cases, including perforation of the mucosa, fistulization, and stenosis of the sigmoid colon. The postoperative mortality was 4/36, due to peritonitis (2), pulmonary embolism (1), and acute pancreatitis (1). The surgical results were good in 29 cases, unsatisfactory in 2, and another patient died of late complications. Exteriorization is recommended in the case of widespread inflammation that makes the separation of the layers of the intestinal wall difficult and increases the risk of mucosal perforation followed by peritonitis. Early carcinoma developing between the diverticula may remain undetected during myotomy, and therefore double-contrast x-ray examination, sigmoidoscopy, and colonoscopy are recommended.

1278 PSEUDOMEMBRANOUS ENTEROCOLITIS IN CHILDHOOD.

(Eng.) Buts, J. P.; Weber, A. M.; Roy, C. C.; Morin, C. L. (Hopital Ste-Justine, 3175, Ste-Catherine Rd., Montreal, Quebec H3T 1C5, Canada). *Gastroenterology* 73(14, Part 1):823-827; 1977.

The clinical, laboratory, and histologic features in five children (5-12 yr) with pseudomembranous enterocolitis are presented. The clinical syndrome, characterized by the acute onset of profuse diarrhea, occurred postoperatively in two patients. All patients had received or were taking antibiotics (penicillin, ampicillin, clindamycin). The disease was severe in four children, who presented with hypoproteinemia. Related complications were edema, ascites, pleural effusion, septicemia, and/or shock. The diagnosis was made on the basis of typical rectosigmoidoscopic findings. Despite intensive therapy (i.v. steroids, nafcillin, and gentamicin; plasma infusions; parenteral alimentation), two children died. The use of parenteral nutrition is advocated in severe cases with exudative enteropathy. When profuse diarrhea occurs postoperatively or does not rapidly subside with discontinuation of antibiotic therapy, a high index of suspicion should be maintained, even in children, for the possibility of pseudomembranous enterocolitis. An emergency rectosigmoidoscopy should be done to make an early diagnosis.

1279 DYSTROPHIC EPIDERMOLYSIS BULLOSA. INTERESTING GASTRO-INTESTINAL MANIFESTATIONS.

(Eng.) Sehgal, V. N.; Rege, V. L.; Ghosh, S. K.; Kamat, S. M. (Goa Medical Coll., Panaji 403 001, Goa, India). *Br. J. Dermatol.* 96(4):389-392; 1977.

The case of a 20-yr-old woman with a long-standing case of dystrophic epidermolysis bullosa in whom gastrointestinal manifestations occurred is presented. Involvement of the large intestine was characterized by recurrent episodes of diarrhea synchronizing with exacerbation of the skin lesions. The radiological investigations revealed two narrow segments, one each in the descending and transverse colon, with ulcer craters in the lower part of the former. The haustra from the distal half of the transverse colon to the sigmoid colon were lost.

1280 INTERNAL SPHINCTER AND THE NATURE OF HAEMORRHOIDS.

(Eng.) Hancock, B. D. (Wythenshawe Hosp., Manchester, England). *Gut* 18(8):651-655; 1977.

To investigate the relationship between an overactive internal anal sphincter and the symptoms of hemorrhoids, internal anal sphincter activity was studied in 84 patients with hemorrhoids and 40 controls without anorectal symptoms. Activity was estimated by measuring maximum resting anal pressure with a water-filled anal balloon probe 7 mm in diameter connected to a strain gauge pressure transducer. There was greater activity of the internal sphincter in patients with hemorrhoids than in controls (107 ± 23.0 versus 85.0 ± 20.5 cm H_2O, $p<0.001$), but there was no significant relation between sphincter activity and duration of symptoms, predominant symptom (bleeding or prolapse), severity of symptoms, history of pain, history of straining at stool, or size of hemorrhoids. Straining at stool occurred significantly more often in patients whose main complaint was prolapse than in those whose main complaint was bleeding ($p<0.025$). Anal dilatation reduced sphincter activity, and the best clinical results were obtained in those with the most active sphincter. An internal sphincter abnormality may be an etiological factor in some patients with hemorrhoids, but there must be other factors as well. Straining at stool may determine whether bleeding or prolapse is the predominant symptom.

1281 METRONIDAZOLE IN THE TREATMENT OF CHRONIC PROCTITIS: A CONTROLLED TRIAL.

(Eng.) Davies, P. S.; Rhodes, J.; Heatley, R. V.; Owen, E. (Univ. Hosp. Wales, Cardiff, Wales.) *Gut* 18(8):680-681; 1977.

The effect of metronidazole treatment was tested in a double-blind controlled study of 22 patients with chronic proctitis. In the crossover study, the patients were given metronidazole suppositories (500 mg, 3 times daily) or a placebo in randomized order during two consecutive 28-day periods. The patients recorded the frequency of daily bowel actions and the occurrence of rectal bleeding, and at the end of each period indicated their assessment of their clinical progress. Of the 18 patients completing the trial, 10 noticed no difference between the two periods, 5 improved on placebo, and 3 improved during the metronidazole period. There were no significant differences in stool frequency, blood loss, the sigmoidoscopic appearance of the rectal mucosa, or histologic changes during the two periods. Metronidazole, given for 28 days, does not appear to benefit patients with proctitis, although initial observations in an open trial had been encouraging.

1282 SPHINCTER DENERVATION IN ANORECTAL INCONTINENCE AND RECTAL PROLAPSE.

(Eng.)

Parks, A. G.; Swash, M.; Urich, H. (St. Mark's Hosp., London, England). *Gut* 18(8):656-665; 1977.

Biopsies of the external anal sphincter, puborectalis, and levator ani muscles were examined in 6 controls, in 24 women and 1 man with long-standing anorectal incontinence (18 of whom also had rectal prolapse), and in 2 men with rectal prolapse alone. In 16 of the women, anorectal incontinence was of unknown cause, but in 8 there was a history of difficult labor. In all the incontinent patients, there was histological evidence of denervation, which was most prominent in the external anal sphincter muscle biopsies, and least prominent in the levator ani muscles. Myopathic features, which were thought to be secondary, were present in the more abnormal biopsies. There were severe histological abnormalities in small nerves supplying the external anal sphincter muscle in the three cases in which material was available for study. Idiopathic anorectal incontinence may be the result of denervation of the muscles of the anorectal sling, and of the anal sphincter mechanism. This denervation could result from entrapment or stretch injury of the pudendal or perineal nerves occurring as a consequence of rectal descent induced during repeated defecation straining, or from injuries to these nerves associated with childbirth.

1283 CANCER OF THE RECTUM IN OLD AGE, VALUE OF LAPAROSCOPIC INVESTIGATION AND C.E.A. MONITORING [Abstract]. (Eng.) Thorsoe, H. (Silkeborg Centralsygehus, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):106; 1977.

1284 THE PROGNOSIS IN ULCERATIVE PROCTITIS [Abstract]. (Eng.) Sparso, B. H.; Dyring-Andersen, K.; Kragelund, E.; Bonnevie, O. (Hvidovre Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):101; 1977.

1285 A DOUBLE-BLIND STUDY OF METRONIDAZOLE IN PREOPERATIVE TREATMENT BEFORE COLO-RECTAL SURGERY [Abstract]. (Eng.) Semb, L. S.; Dyrstad, A.; Johnsrud, M. L.; Grabner, P. J.; Viddal, K. O. (Diakonhjemmers Hosp., Oslo 3, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):94; 1977.

1286 THE RESPONSE PATTERN OF IMMUNOGLOBULIN-PRODUCING CELLS IN COLON MUCOSA ADJACENT TO CARCINOMA [Abstract]. (Eng.) Rognum, T. O.; Baklien, K.; Brandtzaeg, P. (Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):79; 1977.

1287 BLADDER DRAINAGE FOLLOWING SURGERY FOR RECTAL CANCER [Abstract]. (Eng.) Rasmussen, O. V.; Korner, B.; Moller-Sorensen, P.; Kronborg, O. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):76; 1977.

1288 IS TRANSVERSOSTOMY PREFERABLE TO COECOSTOMY [Abstract]? (Eng.) Pillgram-Larsen, J.; Haffner, J. F. W.; Normann, E. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):71; 1977.

1289 DEMONSTRATION OF CANCER CELL SUBPOPULATIONS WITH DIFFERENT DNA CONTENT IN HUMAN COLO-RECTAL CARCINOMAS [Abstract]. (Eng.) Petersen, S. E.; Bichel, P.; Lorentzen, M. (Aarhus Municipal Hosp., Aarhus, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):70; 1977.

1290 RESULTS OF CONTINENT ILEOSTOMY (KOCK'S OPERATION) [Abstract]. (Eng./Ger.) Schaudig, A.; von Bary, S.; Loeschke, K.; Ruckdeschel, G. (Universitatsklinik Munchen, Nussbaumstrasse 20, D-8000 Munchen, W. Germany). *Langenbecks Arch. Chir.* 345:588-589; 1977.

1291 RESULTS OF RECTUM INTRAMURAL LYMPHOGRAPHY [Abstract]. (Eng./Ger.) Junemann, A.; Schacht, U.; Rumpf, P. (Universitatsklinik A, Moorenstr. 4, D-4000 Dusseldorf, W. Germany). *Langenbecks Arch. Chir.* 345:611-612; 1977.

1292 IVALON SPONGE IMPLANTATION IN TREATMENT OF RECTAL PROLAPSE [Abstract]. (Eng./Ger.) Schiller, U.; Zuhlke, V. (Klinik fur Allgemeinchirurgie der Universitat, Gosslerstrasse 2, D-3400 Gottingen, W. Germany). *Langenbecks Arch. Chir.* 345:612-613; 1977.

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1300 SINGLE LAYER COLONIC ANASTOMOSIS [Abstract]. (Eng.) Koudahl, G.; Villumsen, A. (Diakonissestiftelsens Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45): 47; 1977.

1301 CELLULAR AND HUMORAL INDICES OF DISEASE ACTIVITY IN INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Koldkjaer, O.; Klitgaard, N. A.; Schmidt, K. G. (Odense Univ. Hosp., Odense, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45): 46; 1977.

1302 THE RELIABILITY OF THE PATHO-ANATOMICAL DIAGNOSIS OF CANCER OF THE COLON AND RECTUM WITH SPECIAL REFERENCE TO THE CLASSIFICATIONS OF DUKES AND BRODERS [Abstract]. (Eng.) Johansen, A. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):42; 1977.

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1310 PROGNOSTIC SIGNIFICANCE OF PERIPHERAL LYMPHOCYTE COUNTS AND CARCINOEMBRYONIC ANTIGENS IN COLORECTAL CARCINOMA. (Eng.) Kim, U. S.; Papatestas, A. E.; Aufses, A. H., Jr. (Mt. Sinai Sch. Medicine, New York, NY 10029). *J. Surg. Oncol.* 8(3):257-262; 1976.

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1316 PALLIATIVE OPERATIONS FOR RECTAL CANCER. (Rus.) Pokrovsky, G. A.; Brusilovsky, M. I.; Gofman, A. M.; Yulaev, V. N. (Khir. Otd., n.i. Lab. Proktol. Klin., Moscow, USSR). *Khirurgiia (Mosk.)* 52(7):116-120; 1976.

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1318 BIOPSY DIAGNOSIS OF INFECTIVE COLITIS [Abstract]. (Eng.) Day, D. W.; Mandal, B. K.; Morson, B. C. (St. Mark's Hosp., London, England). *Gut* 18(11):A986; 1977.

1319 CELL KINETIC AND CYCLIC AMP STUDIES IN COLORECTAL CARCINOMA--A GUIDE TO EARLIER DIAGNOSIS [Abstract]? (Eng.) Tregoning, D.; Turner, G.; Watson, A. J.; Britton, D. C.; Bone, G.; Latner, A. L. (Dept. Surgery, Univ. Newcastle upon Tyne, Newcastle upon Tyne, England). *Gut* 18(11):A987; 1977.

1320 RECTAL IgE CELLS IN INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) O'Donoghue, D. P.; Kumar, P. J. (St. Bartholomew's Hosp., London, England). *Gut* 18(11):A986; 1977.

1321 IS THERE A MYOELECTRICAL ABNORMALITY IN THE IRRITABLE COLON SYNDROME [Abstract]? (Eng.) Taylor, I.; Darby, C.; Hammond, P.; Basu, P. (Dept. Surgery, Univ. Liverpool, Liverpool, England). *Gut* 18(11):A990; 1977.

1322 SIMILARITY OF BOWEL DISTENSION CHARACTERISTICS IN THE IRRITABLE COLON SYNDROME AND DIVERTICULOSIS [Abstract]. (Eng.) Ritchie, J. (Radcliffe Infirmary, Oxford, England). *Gut* 18(11):A990; 1977.

1323 SPECTRUM OF HEPATIC DYSFUNCTION IN INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Dew, M. J.; Allan, R. N. (General Hosp., Birmingham, England). *Gut* 18(11):A970-A971; 1977.

1324 RADIOTHERAPY IN THE TREATMENT OF CARCINOMA OF THE RECTUM AND COLON. (Fre.) Tawil, E.; Mercier, J. P. (Hopital Maisonneuve, Rosemont, Montreal, Canada). *Union Med. Can.* 105(7):1058-1062; 1976.

1325 SIGMOID VOLVULUS. (Eng.) Moseson, D. L.; Lindell, T.; Brant, B.; Krippaehne, W. (Univ. Oregon Health Science Center, Portland, OR). *Am. Surg.* 42(7):492-497; 1976.

1326 GIANT PSEUDOPOLYPOSIS MIMICKING COLON CANCER [Abstract]. (Eng.) Gruner, O. P. N.; Refsum, S.; Fausa, O.; Hognestad, J. (Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):29; 1977.

1327 PREOPERATIVE BOWEL STERILIZATION WITH NEOMYCIN-BACITRACIN. A CONTROLLED TRIAL [Abstract]. (Eng.) Balslev, I.; Bryde, S.; Andersen, S. B.; Back-Nielsen, P. (Aalborg Sygehus, afsnit Syd, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):6; 1977.

See also, 0781, 0785, 0786, 1040, 1074, 1075, 1081, 1086, 1087, 1088, 1090, 1102, 1111, 1119, 1120, 1159, 1160, 1232, 1235, 1237, 1244, 1255, 1256, 1257, 1259, 1268, 1329, 1331, 1333, 1477, 1628, 1629, 1631, 1633, 1641, 1645, 1651, 1656, 1658, 1661, 1669, 1673, 1679, 1687, 1690.

LARGE INTESTINE

Ulcerative Colitis

1328 EMERGENCY COLECTOMY FOR INFLAMMATORY BOWEL DISEASE. (Eng.) Block, G. E.; Moossa, A. R.; Simonowitz, D.; Hassan, S. Z. (Dept. Surgery, Univ. Chicago, Chicago, IL 60637). *Surgery* 82(4):531-536; 1977.

The results of emergency colectomy for complications of inflammatory bowel disease are described in 53 patients who underwent the operation between 1964 and 1976. All patients were treated consecutively by the authors, on the same surgical service. Thirty-nine patients had ulcerative colitis, 13 Crohn's disease, and 1 pseudomembranous colitis. The indication for operation in 23 patients was hemorrhage; 23 other patients had toxic megacolon, 3 had free perforation, and 4 had fulminant disease. All patients with free perforation or fulminant disease underwent abdominal colectomy; 16 of 23 patients with toxic megacolon received abdominal colectomy, and 7 had proctocolectomy. Seven of 23 patients with hemorrhage underwent proctocolectomy, and 16 underwent abdominal colectomy. The operative mortality rate was 5.6%, and the total mortality rate was 9.4%. The overall mortality rate for the complication of toxic megacolon was 8.7%; following abdominal colectomy, it was 6.1%, and after proctocolectomy, 14.3%. The overall mortality rate for the complication of hemorrhage was 8.7%; following proctocolectomy, it was nil, and after abdominal colectomy, 12.5%. This overall mortality rate compares with the previous decade's mortality rate from the same institutions of 23%. Emergency colectomy is indicated in these patients after prompt and vigorous resuscitative measures and can be performed safely. Proctocolectomy is advocated for those patients whose disease is diagnosed and who suffer massive hemorrhage. Abdominal colectomy is indicated in patients with Crohn's disease with a spared rectum, poor-risk patients with fulminant disease, or patients with toxic megacolon with or without perforation.

1329 ULTRASTRUCTURAL ASPECTS OF COLON EPITHELIUM IN PATIENTS WITH ULCERATED AND GRANULOMATOUS COLITIS. (Ita.) Marinozzi, G.; Familiari, G.; Stillo, F.; Luminari, M.; Giannelli, G. (Istituto di Anatomia Umana Normale dell'Universita di Roma, Rome, Italy). *Minerva Gastroenterol.* 22(4):267-276; 1976.

The epithelium of colonic mucosa was examined by electron microscopy in six patients with ulcerated colitis. Tissue to be examined was obtained by biopsy. Mucosa from patients in the quiescent phase of the disease appeared normal. In patients in the active phase of the disease, the columnar cells were reduced in volume, and interstitial spaces were dilated. Intranuclear inclusion bodies of 400-600 A were seen in all patients. These inclusion bodies may be attributable to herpesvirus. In active cases, round granulomatous bodies of 50-150 A were seen, primarily in the nuclei and occasionally in the nucleoli. Cytoplasmic filaments were also seen in many of the epithelial cells examined. Microfilaments were sometimes noted in the nuclei of cells from patients with active colitis. These filaments are probably the result of mucosal dysplasia.

1330 CLINICAL TRIALS. A LOCAL FOAM AEROSOL IN ULCERATIVE COLITIS. (Eng.) Clark, M. L. (St. Leonard's Hosp., London, England). *Practitioner* 219(1309):103-104; 1977.

The value of 10% hydrocortisone delivered in a foam aerosol in the treatment of distal colitis was examined in 20 patients with ulcerative colitis, Crohn's disease, or nonspecific distal colitis. This treatment was ineffective in three patients; of these, one responded to steroid enemas, while p.o. steroids was necessary in two. Of the 17 patients in whom the foam was effective, 12 had previously received steroid enemas; three of these found the foam enemas more effective than the steroid enemas, while the remainder thought there was no difference between the two treatments. Eleven of the 12 patients who had previously received steroid enemas found that the foam was easier to use. It is concluded that hydrocortisone foam aerosol is a practical and effective form of therapy in cases in which rectal steroids are indicated.

1331 C3 METABOLISM IN ULCERATIVE COLITIS AND CROHN'S DISEASE. (Eng.) Hodgson, H. J. F.; Potter, B. J.; Jewell, D. P. (Massachusetts General Hosp., Boston, MA). *Clin. Exp. Immunol.* 28(3):490-495; 1977.

The metabolism of the third component of complement (C3) was studied in four patients with ulcerative colitis (UC), three patients with Crohn's disease (CD), and seven control subjects. Metabolically functional radioiodinated C3 was isolated from fresh human plasma. The fractional catabolic rates for ^{125}I-labeled C3, expressed as percent of the intravascular pool per hour, were increased ($p<0.0025$) in patients with inflammatory bowel disease (UC, mean 3.01 ± 0.17; CD, mean 3.23 ± 0.14) as compared to the controls (mean 2.05 ± 0.19). The synthesis rate of C3 also increased in UC and CD patients ($p<0.001$). The mean synthesis rate of C3 among CD patients was higher (3.55 ± 0.805 mg/kg/hr) than among UC patients (1.853 ± 0.582 mg/kg/hr, $p<0.05$), and both of these rates were higher than the control rate (1.194 ± 0.110 mg/kg/hr). However, the serum C3 levels were normal (UC, mean 128 ± 20 mg/100 ml) or raised (CD, 184 ± 16 mg/100 ml) in patients with inflammatory bowel disease, the control value being 132 ± 10 mg/100 ml. Thus, there was a significant positive correlation between the fractional catabolic rate of C3 and albumin ($p<0.05$), but no correlation of this rate with serum concentration, among the patients. The results suggest that complement activation may play a role in the pathogenesis of mucosal inflammation in UC and CD.

1332 MENTAL DISTURBANCE IN PATIENTS WITH ULCERATIVE COLITIS [Abstract]. (Eng.) Gruner, O. P. N.; Naas, R.; Gjone, E.; Flatmark, A.; Fretheim, B. (Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):28; 1977.

1333 EXTENSION OF INFLAMMATORY CHANGES IN CHRONIC COLITIS ASSESSED BY RADIOLOGY, COLONOSCOPY AND ENDOSCOPIC BIOPSIES [Abstract]. (Eng.) Granqvist, S.; Gabrielsson, N.; Sundelin, P. (Huddinge Univ. Hosp., Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):27; 1977.

1334 ULCERATIVE COLITIS AND PREGNANCY. SURGICAL TREATMENT OF ACUTE COMPLICA-

TIONS. (Ger.) Winkler, R. (Chir. Univ. Klin., Hamburg, W. Germany). *Dtsch. Med. Wochenschr.* 101(25):963-965; 1976.

1335 SURGICAL TREATMENT FOR ULCERATIVE COLITIS. (Jpn.) Tsuchiya. S.; Takemura, H.; Matsuda, Y. (Sch. Medicine, Yokohama City Univ., Yokohama, Japan). *Stomach Intest. (Tokyo)* 11(8): 1005-1014; 1976.

1336 A STATISTICAL SURVEY OF ULCERATIVE COLITIS IN JAPAN. (Jpn.) Yokota, A.; Utsonomiya, T.; Suzuki, K. (Natl. Okura Hosp., Tokyo, Japan). *Stomach Intest. (Tokyo)* 11(8):1023-1028; 1976.

See also, 1262, 1290, 1301, 1318, 1320, 1321, 1323.

PANCREAS

1337 HIGH BREAST-MILK SODIUM IN CYSTIC FIBROSIS [Letter to Editor]. (Eng.) Whitelaw, A.; Butterfield, A. (Queen Charlotte's Maternity Hosp., London W6 OXG, England). *Lancet* 2(8051):1288; 1977.

1338 HETEROZYGOTE DISADVANTAGE IN CYSTIC FIBROSIS [Letter to Editor]. (Eng.) Super, M. (P.O. Box 2619, Windhoek, South West Africa). *Lancet* 2(8051):1288; 1977.

1339 IS PARTIAL DUODENOPANCREATECTOMY JUSTIFIED IN CASES OF CANCER OF THE PANCREAS [Abstract]? (Eng./Ger.) Fuchsjager, N.; Funovics, J.; Fritsch, A. (Univ. Klinik, Alserstrasse 4, A-1090 Wien, Austria). *Langenbecks Arch. Chir.* 345:585; 1977.

1340 VASCULAR PROBLEMS DURING PANCREATECTOMY [Abstract]. (Eng./Ger.) Trede, M.; Kersting, K. H.; Bottger, E. (Klinikum Mannheim der Universitat Heidelberg, Theodor Kutzer-Ufer, D-6800 Mannheim, W. Germany). *Langenbecks Arch. Chir.* 345:585-586; 1977.

1341 WDHA-SYNDROME AND VASOACTIVE INTESTINAL POLYPEPTIDE [Abstract]. (Eng.) Semb, L. S.; Carlsen, E.; Fahrenkrug, J.; Schaffalitzky de Muckadell, O. (Diakonhjemmets Hosp., Oslo 3, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45): 93; 1977.

1342 THE DIAGNOSIS OF PANCREATIC MALIGNANCIES BY ENDOSCOPIC RETROGRADE PANCREATOGRAPHY (ERCP) COMBINED WITH ENDOSCOPIC RETROGRADE BRUSH CYTOLOGY (ERBC) AND ENDOSCOPIC ASPIRATION CYTOLOGY (EAC) [Abstract]. (Eng.) Osnes, M.; Serck-Hanssen, A.; Swensen, T.; Aune, S.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12 (Suppl. 45):69; 1977.

1343 ALTERED GASTRIC SECRETORY RESPONSES TO A SOLID-LIQUID MEAL IN PANCREATIC INSUFFICIENCY (PI) [Abstract]. (Eng.) Regan, P. T.; Malagelada, J. R.; Go, V. L. W.; DiMagno, E. P. (Mayo Clinic, Rochester, MN). *Clin. Res.* 25(4): 608A; 1977.

1344 DIAGNOSTIC VALUE OF THE ORAL PANCREATIC FUNCTION TEST (PFT) [Abstract]. (Eng.) Mitchell, C. J.; Humphrey, C. S.; Bullen, A. W.; Kelleher, J. (Dept. Medicine and Surgery, Univ. Leeds, Leeds, England). *Gut* 18(11):A979-A980; 1977.

1345 THE LUNDH MEAL AND ERCP IN PANCREATIC DISEASE [Abstract]. (Eng.) Ashton, M. G.; Axon, A. T. R.; Lintott, D. J. (Leeds General Infirmary, Leeds, England). *Gut* 18(11):A980; 1977.

1346 PANCREATIC JUICE ANALYSIS, CARCINOEMBRYONIC ANTIGEN (CEA) AND ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP) IN THE DIAGNOSIS OF PANCREATIC DISEASE [Abstract]. (Eng.) Carrlocke, D. L. (Dept. Medicine, Univ. Leicester, Leicester, England). *Gut* 18(11):A980-A981; 1977.

1347 DIFFERENTIATION STAGES OF EXOCRINE CELLS IN THE HUMAN PANCREAS; ULTRASTRUCTURE AND POLYSACCHARIDE CONTENTS [Abstract]. (Eng.) Dutrillaux, M. C.; Hollande, E. (Laboratoire de Physiologie Cellulaire, Universite P. et M. Curie, 4 Place Jussieu, 75005, Paris, France). *Ir. J. Med. Sci.* 146(Suppl. 1):32; 1977.

See also, 0884, 1045, 1090, 1102, 1126, 1127, 1128, 1130, 1231, 1256, 1265, 1545, 1562, 1596, 1632, 1640, 1644, 1674.

PANCREAS

Pancreatitis

1348 ELECTROCARDIOGRAPHIC ALTERATIONS IN ACUTE PANCREATITIS. (Spa.) Bartolome-E., J.; Garnacho, A.; Frison, J. C.; Valle, V.; Rubies-Prat, J. (Ciudad Sanitaria de la Seguridad Social, Universidad Autonoma, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(4):539-544; 1977.

The electrocardiogram (ECG) patterns of 40 patients treated for acute pancreatitis were studied to evaluate the incidence and establish the type of ECG alterations in these patients. In 18 patients, the ECG's were normal. Abnormal ECG alterations in eight patients could not be properly evaluated. In four patients, ECG irregularities persisted after the acute phase of the disease: in a 70-yr-old man, ECG signs of myocardial necrosis persisted for 2 months with no evidence of elevated enzyme levels; 58-yr-old and 50-yr-old patients with pancreatic disease presented with ECG's characteristic of subepicardial ischemia that persisted for 2 months; and a 9-yr-old patient had an ECG indicative of a first degree auriculoventricular block, which continued for 1 yr after his pancreatitis was cured. Repolarization disorders were found in 10 patients; these disorders returned to normal 2-3 months after after the cure. The recognition of this ECG pattern in acute pancreatitis is an important aid in differentiating between acute pancreatitis and ischemic cardiopathy.

1349 ACUTE PANCREATITIS OF RARE CAUSATION. (Eng.) Pellegrini, C. A.; Acosat, J. M.; Skinner, D. B. (Univ. Chicago Hosp., Chicago, IL). *Surg. Gynecol. Obstet.* 144(6):899-902; 1977.

The cases of eight patients with acute pancreatitis resulting from rare causes are presented. Obstruction of the common pancreatic duct occurred in four patients, and pancreatitis in the remaining four patients resulted from direct parenchymal injury or vascular lesions. In two cases, the ampulla of Vater was obstructed by a foreign body (a T tube in one and a hydatid membrane in the other). In a third patient, obstruction of the pancreatic duct by a tumor resulted in pancreatitis and pseudocyst formation distal to the mass. In a fourth patient, the patency of the pancreatic duct and the more severe and generalized pancreatic injury suggested that mechanisms other than obstruction were involved in the development of acute pancreatitis in association with pancreatic carcinoma. In another patient, pancreatitis was limited to the portion of the pancreas that was to the left of the point of obstruction (a benign stricture of the proximal portion of the main pancreatic duct); a pancreaticojejunostomy provided successful decompression of the obstructed pancreas in this case. In the sixth patient, hyperparathyroidism associated with a large adenoma appeared to be the primary cause of pancreatitis, and this was successfully treated by parathyroidectomy. In the remaining patients, pancreatitis was caused by celiac axis thromboembolism and periarteritis nodosa involving the arterioles of the pancreas, resp. Necrosis occurred in both cases. Surgery is the treatment of choice for pancreatic duct obstruction.

1350 ACUTE PANCREATITIS ASSOCIATED WITH GALLSTONES IN A TWELVE-YEAR-OLD GIRL. (Eng.) Pease, R. (St. James' Hosp., Leeds, England). *Aust. N.Z. J. Surg.* 47(1):87-89; 1977.

The case of a 12-yr-old girl with acute pancreatitis associated with gallstones is presented. The patient had a 1-yr history of intermittent attacks of epigastric pain associated with vomiting. Abdominal examination revealed striking rebound tenderness. Pancreatitis was diagnosed at the first operation, but multiple stones in the gallbladder were not detected, probably because they floated freely within the viscid bile. Three weeks postoperatively, the patient's symptoms returned, and an oral cholecystogram demonstrated multiple small stones. At cholecystectomy, the gallbladder was found to contain 32 small faceted stones. The patient has remained asymptomatic since the second operation. Although pancreatitis is a rare disease in childhood, this diagnosis should be considered in cases of unusual abdominal pain, especially when associated with clinical evidence of ascites.

1351 NUTRITIONAL ASPECTS OF CHRONIC PANCREATITIS IN VERONA, ITALY. (Eng.) Vantini, I.; Cavallini, G.; Angelini, G.; Piubello, W.; Bovo, P.; Benini, L.; *et al.* (III Clinica Medica dell'Universita di Padova, 37100 Verona, Italy). *Rend. Gastroenterol.* 9(1):13-17; 1977.

Nutritional habits before the clinical onset of well-defined chronic relapsing pancreatitis were evaluated in 67 patients from Verona, Italy and 67 paired controls from the same region. The caloric intake of the patients with pancreatitis was significantly higher than that in the controls, both when the total intake (including alcohol) and the alimentary calories were considered ($p<0.001$). The absolute mean intake of proteins, fats, and carbohydrates in the patients (155.9 ± 64.2, 110.5 ± 47.6, and 432.6 ± 192.7 g/day) was significantly higher than that of the controls (112.3 ± 34.6, 77.2 ± 20.8, and 291.6 ± 86.9 g/day, resp., $p<0.001$), but when the data were expressed as percentages of the alimentary calories or of total calories, these differences were not significant.

1352 A SWISS FAMILY WITH HEREDITARY CHRONIC RECURRENT CALCIFYING PANCREATITIS. (Ger.) Bieler, M.; Hammer, B. (Medizinische Klinik, Kantonsspital, CH-9006 St. Gallen, Switzerland). *Schweiz. Med. Wochenschr.* 107(29):1035-1040; 1977.

Hereditary chronic recurrent calcifying pancreatitis in a Swiss family is reported. The disease was confirmed in five patients, the mother and her four children. The age at manifestation of the disease (episodic abdominal pains with emesis) ranged from 8 to 20 yr. Four of the five patients have had diabetes mellitus since the age of 15-40 yr. The fecal fat content was increased in three cases (25.6-53.3 g/day); the fecal chymotrypsin level was 5-48 μg/g versus a normal value of >130 μg/g; and the fecal trypsin level was 2-11 μg/g versus a normal level of >30 μg/g. Lysine and cystine were found in the urine at low, nonpathologic levels. Four other members of the family (the mother's father, her brother, the brother's son, and one of the mother's grandchildren) are suspected of having this disease. Twenty-five families with this disease have been reported in the literature. It is inherited as an autosomal dominant disorder; its pathogenesis is unknown. It is possible that an abnormal pancreatic juice is produced, which causes intracanalicular calcification. The treatment is identical to that of nonhereditary forms, i.e., generally conservative.

1353 EFFECT OF CAERULEIN ON γ-GLUTAMYL TRANSPEPTIDASE AND ALKALINE PHOSPHATASE IN THE DUODENAL JUICE IN CHRONIC PANCREATITIS. (Eng.) Delcourt, A.; Mesa, A.; Wettendorff, P.; Van Melsen, A. (Hopital d'Ixelles, Bruxelles, Belgium). *Digestion* 15(5):385-389; 1977.

The mechanism involved in the abnormally high output of γ-glutamyl transpeptidase (GGT) and alkaline phosphatase (AP) in the duodenal juice in chronic pancreatitis (CP) was investigated in 10 fasted normal controls, 10 patients with chronic pancreatitis, and 3 cholecystectomized patients. The increase of AP and GGT was significantly higher ($p<0.001$) in CP patients than in controls after the administration of cerulein (i.v. for 80 min at 75 ng/kg/hr). This abnormality was not limited to the calcifying type, since among the 10 cases studied only 6 presented pancreatic calcifications. The parallelism of the increase in output of GGT and AP in control and CP patients suggests that same mechanism is involved in both cases. However, the presence of a functioning gallbladder is necessary for this effect to occur, since in cholecystectomized patients and in the patient with T-tube drainage of the biliary tract no increase of GGT was observed after the administration of increasing doses of cerulein in single shots. The effect is not related to the discharge of large amounts of the enzymes by the diseased pancreas. It is suggested that the difference between controls and CP patients is related to an abnormality of the biliary system associated with chronic pancreatitis.

1354 HEREDITARY PANCREATITIS: A FAMILY WITH 4 AFFECTED MEMBERS. (Spa.) Jimenez Caballero, R.; Salinas Carmona, M. C.; Campuzano Fernandez, M.; Perez-Briceno, R.; Lisker Y., R.; Cario, A. (Instituto Nacional de la Nutricion, Av. San Fernando y Viaducto Tlalpan, Mexico 22, D.F.). *Rev. Invest. Clin. (Mex.)* 29(2):165-169; 1977.

1355 RELATIONSHIP BETWEEN HEMOSTASIS AND BLOOD KININS IN PANCREATITIS. (Rus.) Orlov, V. A.; Yakunin, G. A. (Clinical Hosp. No. 20, Moscow, USSR). *Klin. Med. (Mosk.)* 55(8):84-90; 1977.

1356 HEMORRHAGE COMPLICATIONS OF ACUTE PANCREATITIS. (Fre.) Dauchel, J.; Michel, J. M.; Coumaros, D.; Bockel, R.; Marescaux, J.; Sava, G.; Grenier, J. F. (Hospices Civils, 67005 Strasbourg Cedex, France). *J. Chir. (Paris)* 113(2):171-180; 1977.

1357 DIAGNOSIS OF CHRONIC PANCREATITIS. (Ita.) Blum, A. L.; Bruhlmann, W.; Peter, P.; Krejs, G. J. (Hopital Civil Triemli, Zurich, Switzerland). *Minerva Med.* 15(2/3):3621-3634; 1976.

1358 AN EDEMATOUS FORM OF ACUTE PANCREATITIS. (Rus.) Titov, B. M. (12th Municipal Clinical Hosp., Kazan, USSR). *Vestn. Khir.* 117 (7):26-29; 1976.

1359 DUODENAL INTRAMURAL HEMATOMAS OF PANCREATIC ORIGIN. (Fre.) Essioux, H.; Bensaude, R. J.; Cristau, P.; Pailler, J. L.; Molinie, C.; Kassem, A.; *et al.* (Hopital Militaire Begin, F 94160 Saint-Mande, France). *Arch. Fr. Mal. App. Dig.* 65(4):271-275; 1976.

1360 DELAYED OPERATION FOR ACUTE PANCREATITIS. (Ger.) Neher, M.; Kummerle, F.; Mangold, G.; Schonborn, H. (Chirurgische Univ.-Klinik, Langenbeckstrasse 1, D-6500 Mainz 1, W. Germany). *Chirurg* 48(7):439-443; 1977.

1361 SURGICAL TREATMENT OF CHRONIC PANCREATITIS. (Fre.) Sarles, J. C.; Delecourt, P.; Castelo, H. (Hopital D'Aubagne, Avenue du Petit Canedel, Aubagne 13677, France). *Arq. Gastroenterol. Sao Paulo* 14(2):83-88; 1977.

1362 BLOOD SERUM ENZYMES AND ISOENZYMES IN ACUTE PANCREATITIS. (Rus.) Suvalskaya,

L. A.; Bonitenko, Yu. Yu.; Kovalchuk, V. I. (Yu. Yu. Dzhanelidze Scientific Res. Inst. First Aid, Leningrad, USSR). *Klin. Med. (Mosk.)* 55(6):63-67; 1977.

1363 ASPECTS OF PANCREATITIS PATHOGENESIS.

(Rus.) Orlov, V. A.; Belyakov, N. V. (Clinical Hosp. No. 20, Moscow, USSR). *Klin. Med. (Mosk.)* 55(6):59-63; 1977.

See also, 0885, 1102, 1126, 1321, 1345, 1346, 1553, 1567, 1674.

LIVER AND BILIARY TRACT

1364 ASSESSMENT OF THE PLASMA DISAPPEARANCE OF CHOLYL-1^{14}C-GLYCINE AS A TEST OF HEPATOCELLULAR DISEASE.

(Eng.) Thjodleifsson, B.; Barnes, S.; Chitranukroh, A.; Billing, B. H.; Sherlock, S. (Landspitalinn, Reykjavik, Iceland). [illegible](9) 697-70[illegible]; 1977.

To assess the value of the plasma disappearance of cholyl-1^{14}C-glycine for the detection of hepatic dysfunction, the plasma disappearance of a tracer dose of cholyl-1^{14}C-glycine (10 μCi, 0.2 μmol, i.v.) was examined in 12 control subjects and in 32 patients with hepatocellular dysfunction. Simple analysis of the data did not detect hepatic dysfunction except in the nine patients with severe hepatocellular disease. The greatest degree of discrimination between normal subjects and patients with mild liver disease was obtained by taking the ratio of the plasma retention at 60 min to that at 10 min; it was similar to that obtained with serum γ-glutamyltransferase. The 2-hr postprandial plasma total bile acid concentration gave complete separation between the control subjects and patients with liver disease. This study shows that the plasma disappearance of a tracer dose of cholyl-1^{14}C-glycine is not a sensitive test of hepatic dysfunction.

1365 DIAGNOSTIC USEFULNESS OF PLASMA CARCINOEMBRYONIC ANTIGEN LEVELS IN ACUTE AND CHRONIC LIVER DISEASE.

(Eng.) Bullen, A. W.; Losowsky, M. S.; Carter, S.; Patel, S.; Neville, A. M. (St. James' Hosp., Leeds LS9 7TF, England). *Gastroenterology* 73(4):673-678; 1977.

Plasma carcinoembryonic antigen (CEA) levels were measured in 87 patients with liver disease and in 25 controls to assess its value in the diagnosis of acute and chronic liver diseases. Raised plasma CEA levels were found in over 90% of 71 patients with chronic liver disease and 50% of 16 patients with acute liver damage (mean control value=12.1 ± 7.8 ng/ml). Levels increased with increasing chronicity and clinical severity of disease. In individual patients, the plasma CEA level fluctuated with the clinical condition. Persistently normal levels were never found in patients with chronic liver disease in poor clinical condition. A very high level suggests a bad prognosis. If CEA is considered together with the SGPT level, a discriminant function can be calculated, separating patients with acute liver damage and those with an acute exacerbation of chronic active hepatitis, with a high degree of certainty. In acute damage, peak CEA levels occur later than the time of maximum liver necrosis, suggesting that the rise is not owing to release of CEA from damaged cells. There is no significant difference in CEA level between patients with and without spontaneous or surgical portosystemic shunts, suggesting that high levels are not attributable to bypass of the liver. The timing of the rise in CEA in acute liver damage suggests that raised levels may be associated with regeneration. The tendency for higher levels to occur in those patients with greater disturbance of liver function suggests altered metabolism or excretion of CEA.

1366 MODIFICATION OF γ-GLUTAMYL TRANSPEPTIDASE IN LIVER DISEASE.

(Ita.) Ragaini, S.; Peracino, A.; Marcovina, S.; Ronchi, E.; Ballini, A.; Mojoli, M. (Ospedale Generale Provinciale di Treviglio e Caravaggio, Italy). *Minerva Med.* 67(43): 2805-2818; 1976.

γ-Glutamyl transpeptidase (GGT) levels were determined in 226 patients, including 20 healthy controls, 118 alcoholics (acute, 18 and chronic, 100), 53 patients with liver cirrhosis, 15 with cholelithiasis without obstructive jaundice, 5 with cholangitis, 6 with chronic aggressive hepatitis (CAH), and 9 with hepatocarcinomas. Increased GGT levels were unusually the result of nonspecific enzyme induction by drugs or alcohol, nonspecific liver damage, or the presence of intra- or extrahepatic cholelithiasis. The majority of patients had one or more of these factors present concurrently. Although elevated GGT levels were present in several conditions, they were determined to be a result of nonspecific induction rather than an indication of the disease state. GGT levels returned to normal when the inducing agent or causative factor was removed from the patient. In CAH and hepatocarcinoma, however, GGT levels were specifically related to the disease state and for a time were the only clinical indications of disease. After correcting for the use of drugs or

lcohol, GGT levels are a precise indication of
hese two diseases.

367 CORRELATIONS BETWEEN ANATOMICAL AND CLIN-
ICAL FEATURES IN LIVER DISEASE PATIENTS
ITH CIRCULATING ANTIBODY OF UNKNOWN ORIGIN. (Ita.)
erme, G.; Rizzetto, M.; Crivelli, O.; Bonino, F.
Ospedale Mauriziano, Turin, Italy). *Minerva Gas-
roenterol.* 22(3):219-226; 1976.

ntinuclear (AN), anti-smooth muscle (ASM), anti-
itochondrial (AMT), antimicrosomal (AMC), and
ntireticular (AR) antibodies were determined by
mmunofluorescence in 1,000 consecutive patients
xamined in the gastroenterology division of Mauri-
ian Hospital. Of the 1,000 patients, 267 had liver
isease with primary parenchymal involvement; 254
ad liver disease with secondary parenchymal in-
olvement, cholelithiasis, or metastases; and 458 had
astrointestinal disease with no evidence of liver
nvolvement. Thirty-three percent of patients with
rimary parenchymal involvement, 6.3% with secondary
arenchymal involvement, and 5.9% with no liver in-
olvement were positive for one or more of the anti-
odies studied. Of the primary parenchymal involve-
ent patients, 65% had acute hepatitis, 59% had
hronic active hepatitis (CAH), 38% had hepatomas,
3% had sclerosing liver disease, and 20% had in-
ctive cirrhosis. ASM antibodies were found in the
ajority of cases; CAH and inactive cirrhosis pa-
ients were AR positive; only CAH patients were AMC
ositive. ASM antibodies were associated with AN
tibodies except in acute hepatitis, where only
% of the patients were AN positive. In order of
requency, patients were positive for ASM, AN, AMT,
IC, and AR. A subgroup of CAH patients according
a single serological marker could not be iden-
ified. There are chronic liver diseases that are
stinct from those of viral etiology or metabolic
sfunction and that are most likely autoimmune
origin.

68 RELATIVE VALUE OF SELECTIVE ARTERIOGRAPHY
AND LAPAROSCOPY IN THE DIAGNOSIS OF HE-
TIC CARCINOMA. (Spa.) Perez-Jimenez, F.; San
rtin, P.; Muro, J.; de Dios, J.; Segura, J. M.
Cuidad Sanitaria de la Seguridad Social "La Paz,"
drid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47
):93-100; 1976.

comparison is made of selective arteriography and
paroscopy in the diagnosis of hepatocarcinoma.
paroscopy allows the direct visualization of the
dominal viscera and the detection not only of the
istence of a tumor, but also of its size, local-
zation, and nature. On the other hand, since he-
tocarcinoma is generally a hypervascularized tumor
eferentially nourished by the hepatic artery,
teriography is also an important diagnostic tool.
paroscopy is contraindicated in cases of cardio-
lmonary insufficiency and alterations in the
neral circulation. On the other hand, arterio-
aphy is dangerous when there are alterations in
ood coagulation. Moreover, there may be ana-
ylactic problems, and there is also the inherent
risk in the manipulation of arteries with atheromatosis. However, arteriography is generally better tolerated by patients. Arteriography is superior to laparoscopy for the determination of the state of the organ and is a tremendous aid to the surgeon in his planning and handling of a resection; laparoscopy permits only the recognition of the state of the peritoneum and the abdominal viscera accessible to such exploration. The authors conclude that arteriography should be the first diagnostic procedure employed when hepatocarcinoma is suspected. Only when the results of the arteriography are doubtful or when the state of the peritoneum and the resting liver needs to be evaluated for therapeutic purposes should laparoscopy be the final exploratory tool in the systematic diagnosis of hepatic tumors.

1369 CONTRIBUTIONS OF LAPAROSCOPE-DIRECTED BIOPSIES TO THE DIAGNOSIS OF PRIMARY NEOPLASMS OF THE LIVER. (Ita.) Fedeli, G.; Anti, M.; Montano, A. M.; Rapaccini, G. L.; Pizzolato, G. P. (Universita Cattolica del S. Cuore, Istituto di Patologia Speciale Medica e Metodologia Clinica, Rome, Italy). *Minerva Med.* 68(25):1709-1718; 1977.

The use of laparoscopy as a diagnostic tool is discussed. Laparoscope-directed biopsies of the liver are very important in the diagnosis of liver disease, particularly the early diagnosis of neoplasms and in the differentiation of benign and malignant liver tumors. Laparoscopic biopsy reduces diagnosis time and presents little or no risk to the patient. A review of the literature and the authors' personal observations with this technique are presented.

1370 PRIMARY LIVER CELL CARCINOMA (PLCC) IN THE NORTHERN GUINEA SAVANNA OF NIGERIA. (Eng.) Fakunle, Y. M.; Ajdukiewicz, A. B.; Greenwood, B. M.; Edington, G. M. (Dept. Medicine, Ahmadu Bello Univ., Zaria and Kaduna, Nigeria). *Trans. R. Soc. Trop. Med. Hyg.* 71(4):335-337; 1977.

The frequency of primary liver cell carcinoma (PLCC) and the clinical and pathological findings in patients with PLCC were studied in the Guinea Savanna country of Nigeria, an area that has one of the highest frequencies of PLCC in the world. During 1973 and 1974, 185 of 1,170 malignancies were diagnosed as PLCC. The highest frequency occurred among men aged 20-49 yr. Abdominal swelling, pain, hepatomegaly, and ascites were the most common symptoms. Hypoalbuminemia (<3 g%) was present in 67% of the examined cases. Alpha$_1$-fetoprotein occurred in 85% of the 172 patients tested. Hepatitis B surface antigen was detected in 49% of 138 patients. Histologically the tumors were well described and trabecular, with a few showing adenoid or clear cell areas. Liver cell dysplasia was present in almost all cases. These clinical and laboratory findings are similar to those in other series in Africa.

1371 HEMOSTATIC FACTORS IN PRIMARY HEPATOCELLULAR CANCER.

(Eng.) van der Walt, J. A.; Gomperts, E. D.; Kew, M. C. (South African Inst. Medical Res., Johannesburg, 2000, South Africa). *Cancer* 40(4):1593-1603; 1977.

Detailed coagulation studies were performed in 19 South African black men with primary hepatocellular cancer (PHC), and the results were compared with those in 19 age-matched controls. Various functional and immunochemical methods were employed in determining the possible presence of functional or structural coagulant protein abnormalities. The patient group was characterized by prolonged prothrombin times ($p<0.001$), partial thromboplastin times ($p<0.001$), and Reptilase times ($p<0.001$); increased levels of fibrinogen, factor VIII, and factor VIII-related antigen; moderately decreased levels of factor V, factor IX, factor X, antithrombin III, and plasminogen; and reduced levels of factor II and factor VII (all $p<0.001$). Functional, immunochemical, and biochemical analysis failed to detect the presence of acquired protein abnormalities. These findings indicate that hemostatic changes in primary hepatocellular cancer are nonspecific in character. Severe alterations in the plasma levels of one or more of these hemostatic factors may occur.

1372 SERUM GLUTAMIC OXALACETIC TRANSAMINASE/GLUTAMIC PYRUVIC TRANSAMINASE RATIOS IN HEPATOCELLULAR CARCINOMA.

(Eng.) Shimokawa, Y.; Okuda, K.; Kubo, Y.; Kaneko, A.; Arishima, T.; Nagata, E.; *et al.* (Kurume Univ. Sch. Medicine, Kurume, Japan). *Cancer* 40(1):319-324; 1977.

Changes in SGOT levels and in the SGOT/SGPT ratio were examined in 131 patients with hepatocellular carcinoma (HCC), 76 patients with metastatic liver carcinoma (MLC), and 234 patients with liver cirrhosis. At the onset of the diseases, the SGOT levels in the 39 patients with HCC without cirrhosis, the 92 patients with HCC with cirrhosis, the 234 with cirrhosis alone, and the 76 with metastatic carcinoma were 96 ± 12, 152 ± 14, 84 ± 17, and 64 ± 17 U, resp. The SGPT levels were 42 ± 5, 54 ± 5, 55 ± 4, and 38 ± 5 U, resp., and the SGOT/SGPT ratios were 2.5 ± 0.2, 3.5 ± 0.3, 1.9 ± 0.1, and 2.2 ± 0.1, resp. The differences in SGOT and SGOT/SGPT ratio between the patients with cirrhosis and those with HCC and cirrhosis were highly significant ($p<0.01$). In all patients with HCC, there was a continuous increase in the SGOT level 2-3 months before death, while SGPT remained almost unchanged. In the patients with MLC, a similar, but less prominent change occurred in the preterminal period. Although the LDH activities increased in all groups during the 2 months before death, this was most striking in MLC. The average SGPT level was lower in HCC patients without cirrhosis at autopsy, compared with those with HCC and cirrhosis ($p<0.01$), making the SGOT/SGPT ratio greater in the former patients. The SGPT level was lower in patients with a liver weighing more than 3,500 g than that in patients with a liver weighing less than 1,500 g; since the SGOT level was not much different, the SGOT/SGPT ratio was greater in the former ($0.05> p>0.1$).

1373 MULTIPLE TUMORS AFTER ANDROGEN THERAPY.

(Eng.) Sale, G. E.; Lerner, K. G. (Fred Hutchinson Cancer Res. Center, 1124 Columbia St., Seattle, WA 98104). *Arch. Pathol. Lab. Med.* 101 (11):600-603; 1977.

A case of multiple hepatomas with early peliosis hepatis, multiple pancreatic islet cell tumors, and a renal medullary interstitial cell tumor following 5 yr of androgen and prednisone therapy for idiopathic aplastic anemia is reported. The patient, a 37-yr-old man, died shortly after allogeneic bone marrow transplantation. The hepatic tumors were small and well differentiated, and the pancreatic tumors were of mixed ribbon and islet cell pattern. During the 5-yr period, the patient had received testosterone, oxymetholone, methyltestosterone, fluxymesterone, and prednisone. The tumors in this case probably represent part of a continuum similar to those induced in experimental rats by a combination of carcinogen and androgens, and it would thus seem prudent to designate the hepatomas as adenomas or as hepatomas with variable malignant potential. Exploration of a possible trophic role of androgens or corticosteroids for the renomedullary interstitial cell may be warranted for the study of the renal tumor in this patient.

1374 HEPATOPORTAL ARTERIOVENOUS FISTULA IN PRIMARY CARCINOMA OF THE LIVER.

(Eng.) Nagasue, N.; Inokuchi, K.; Kobayashi, M.; Saku, M. (Kyushu Univ. Sch. Medicine, Fukuoka, Japan). *Surg. Gynecol. Obstet.* 145(4):504-508; 1977.

The correlation between portal circulation and esophageal varices was evaluated in 80 patients with a primary hepatic carcinoma, with special regard to the significance of the presence of hepatoportal arteriovenous fistula. Hepatoportal arteriovenous fistula was found in eight patients. Esophageal varices were observed in 32 of the patients with a hepatoma. Seventeen of 52 patients without hepatoportal arteriovenous fistula had varices compared with all patients with a fistula. A fatal hemorrhage was encountered in five patients with the fistula. A rational treatment for those with the triple lesions (hepatoma, esophageal varices, and hepatoportal arteriovenous fistula) may be a ligation of the hepatic artery.

1375 BENIGN HEPATOCELLULAR TUMORS.

(Eng.) Guzman, I. J.; Gold, J. H.; Rosai, J.; Schneider, P. D.; Varco, R. L.; Buchwald, H. (Univ. Minnesota Medical Sch., Minneapolis, MN 55455). *Surgery* 82(4):495-503; 1977.

All cases diagnosed as benign hepatocellular tumors occurring at the University of Minnesota Hospitals from 1950 to 1976 are summarized, and the tumor pathology, clinical aspects, and possible associatio with the use of oral contraceptives are discussed. Excluding hemangiomas, 40 tumors were reviewed and reclassified. Eighteen were diagnosed as focal nodular hyperplasia (FNH), 10 as hepatocellular adenomas (HCA), 11 as bile duct adenomas (BDA), and 1 as a mesenchymal hematoma. Among the patients with FNH, the female:male ratio was 8:1, and the mean age was 43 ± 18 yr. Two patients were symptomatic; of these, one presented with portal hypertension. Treatment consisted of local resection in 12, left hepatectomy in 1, and right hepatectomy in 2. Eight patients had a history of oral contraceptive or other steroid intake. The tumors occurring after 1964 were larger ($p<0.05$). In the patients with HCA, the female:male ratio was 4:1, and the mean age was 33 ± 20 yr. Five tumors were found at necropsy; the other five were symptomatic. Treatment consisted of local resection in one patient, right hepatectomy in two, and left hepatectomy in one. Three patients had a positive history of oral contraceptive intake. There was no statistically significant difference in the size or the incidence of hepatocellular adenomas between 1950 to 1963 and 1964 to 1976. In BDA, the female: male ratio was 7:4, and the mean age was 57 ± 15 yr. Only one case was symptomatic, and the lesion in this patient measured 10 cm. The other BDA's were 1 cm or less in diameter. There is no suggestion that these tumors are associated with use of birth control pills. This series has a lower proportion of symptomatic patients and of patients on oral contraceptives than is suggested by reviewing the literature. It is concluded that a causal relationship between use of oral contraceptives, or other steroids, and benign hepatocellular tumors cannot be demonstrated. However, this conclusion does not rule out that oral contraceptives, or other steroids, might have a contributory influence on the initiation of certain of these tumors or on tumor size.

1376 SERUM-FERRITIN IN DIAGNOSIS OF HAEMOCHROMATOSIS: A STUDY OF 43 FAMILIES.

(Eng.) Halliday, J. W.; Cowlishaw, J. L.; Russo, A. M.; Powell, L. W. (Royal Brisbane Hosp., Brisbane, 4029, Queensland, Australia). *Lancet* 2(8039): 621-623; 1977.

Two hundred forty-two members of 43 families with idiopathic hemochromatosis were investigated for increased body-iron stores to assess the value of serum ferritin determination as a screening test to detect preclinical disease. The serum iron concentration was elevated in only 76% of relatives with increased iron stores, and it was also elevated in 10% of relatives with normal iron stores. The percentage saturation of transferrin was elevated in all relatives with increased iron stores but also in 33% of relatives with normal iron stores. Serum ferritin was raised in 98% of relatives with increased iron stores and in only three (1.8%) of those with normal iron stores. These three subjects consumed alcohol in excess of 100 g ethanol daily, and their serum ferritin levels fluctuated widely. Increased iron stores were reflected in increased serum ferritin concentrations in subjects as young as 14 yr in whom the liver iron concentration was twice the normal upper limit and before there was any evidence of architectural damage to the liver. The serum ferritin concentration is a useful noninvasive screening test for precirrhotic hemochromatosis.

1377 INFLUENCE OF DEOXYCHOLIC ACID ON BILIARY LIPIDS IN MAN.

(Eng.) Ahlberg, J.; Angelin, B.; Einarsson, K.; Hellstrom, K.; Leijd, B. (Karolinska Institutet at Serafimerlasarettet, Stockholm, Sweden). *Clin. Sci. Mol. Med.* 53(3): 249-256; 1977.

To gain information about the possible influence of deoxycholic acid on the composition of bile, the duodenal bile acid composition was analyzed in 24 control subjects and 107 patients with various types of hyperlipoproteinemia. A highly significant negative correlation was observed between the proportions of deoxycholic acid and cholic acid ($r=-0.80$, $p<0.001$) as well as between deoxycholic acid and chenodeoxycholic acid ($r=-0.58$, $p<0.001$). The patients with gallbladder disease had an increased proportion of deoxycholic acid in their bile. Eight controls were studied before and during the ingestion of 1.9 mmol (0.75 g) of deoxycholic acid daily. In these subjects, a rise in the proportion of deoxycholic acid was also accompanied by a fall in the proportion of both cholic acid and chenodeoxycholic acid in duodenal bile. The biliary lipid composition and cholesterol saturation was determined before and during the administration of 1.9 mmol (0.75 g) of chenodeoxycholic acid (12 patients) or deoxycholic acid (8 patients) daily for 3-4 weeks. The cholesterol saturation was decreased during the chenodeoxycholic acid ingestion (from 10.2 ± 0.7% of total bile lipids to 7.2 ± 0.7%, $p<0.001$), whereas no change occurred in bile saturation during deoxycholic acid administration. The ingestion of chenodeoxycholic acid lowered serum triglyceride, and deoxycholic acid lowered the serum cholesterol. The mechanisms and significances of these findings remain to be determined.

1378 THE IMMUNOELECTRON-MICROSCOPICAL DEMONSTRATION OF ANTIBODIES AGAINST ENDOPLASMIC RETICULUM (MICROSOMES) IN CHRONIC AGGRESSIVE HEPATITIS AND LIVER CIRRHOSIS.

(Eng.) Storch, W.; Cossel, L.; Dargel, R. (Neurologischen Klinik der Karl-Marx-Universitat, DDR-7039, Leipzig, Karl-Marx-Stadter Str. 50, A 2, E. Germany). *Immunology* 32(6):941-945; 1977.

Indirect immunoelectron microscopic observations made on microsomal fractions of rat liver treated with microsomal antibodies obtained from the blood of patients with liver cirrhosis and hepatitis and incubated with peroxidase-labeled antihuman IgG are reported. Microsomal antibodies were detected in the sera of 18 subjects among 1,911 patients included in the investigation. Seven of these 18 patients had chronic aggressive hepatitis, 1 had persistent hepatitis, and 10 had liver cirrhosis. In microsomal fractions treated with serum antibodies from these patients, the fragments of endoplasmic reticulum (microsomes) were less densely packed and less contrasting than in control microsomal fractions that were not treated with sera from patients with microsomal antibodies. Extremely fine granular to amorphous (homogenous) material of high electron density was observed to be localized at the sites of microsomal membranes (fragments of endoplasmic reticulum) so that ring-shaped structures (or vesicles) having relatively thick-walled borders of different width and high electron density were produced. These results were not obtained in parallel tests with control microsomal fractions that were not treated with the microsomal antibodies. The fine granular to amorphous deposits of high electron density may be the substrate of an antibody reaction against membranes of the endoplasmic reticulum, made visible by the aid of peroxidase-labeled antibodies. The results suggest that the antibody reaction is chiefly directed towards the membranes of the endoplasmic reticulum.

1379 NONFUNCTIONING ARGYROPHILIC TUMOR (APUDoma) OF THE HEPATIC DUCT. SIMPLIFIED METHODS OF DETECTING BIOGENIC AMINES IN TISSUE. (Eng.) Judge, D. M.; Dickman, P. S.; Trapukdi, S. (Milton S. Hershey Medical Center, Hershey, PA 17033). *Am. J. Clin. Pathol.* 66(1):40-45; 1976.

1380 LIVER DISEASE IN HEMOPHILIA [Abstract]. (Eng.) Van Thiel, D. H.; Spero, J. A.; Rabin, B. S.; Lewis, J. H. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA). *Gastroenterology* 73(5): 1252; 1977.

1381 THE OCCURRENCE OF CEREBRAL AIR EMBOLISM AND OTHER NEUROLOGICAL COMPLICATIONS AFTER LIVER TRANSPLANTATION [Abstract]. (Eng.) Starzl, T. E.; Schneck, S. A.; Mazzoni, G.; Aldrete, J. A.; Porter, K. A.; Schroter, G. P. J.; *et al.* (Univ. Colorado Medical Center, Denver, CO). *Gastroenterology* 73(5):1248; 1977.

1382 CARCINOEMBRYONIC ANTIGEN AND PHOSPHOHEXOSE ISOMERASE, GAMMAGLUTAMYL TRANSPEPTIDASE AND LACTATE DEHYDROGENASE LEVELS IN PATIENTS WITH AND WITHOUT LIVER METASTASES. (Eng.) Munjal, D.; Chawla, P. L.; Lokich, J. J.; Zamcheck, N. (Boston City Hosp., Boston, MA 02118). *Cancer* 37(4):1800-1807; 1976.

1383 METABOLIC INHIBITION OF POLYMORPHONUCLEAR LEUCOCYTES IN FULMINANT HEPATIC FAILURE. (Eng.) Bailey, R. J.; Woolf, I. L.; Cullens, H.; Williams, R. (King's Coll. Hosp. Medical Sch., London, England). *Lancet* 1(7970):1162-1163; 1976.

1384 PLASMA CYCLIC ADENOSINE 3',5' MONOPHOSPHATE RESPONSE TO GLUCAGON IN PATIENTS WITH LIVER DISEASE. (Eng.) Davies, T. F.; Prudhoe, K.; Douglas, A. P. (Royal Victoria Infirmary, Newcastle upon Tyne, England). *Br. Med. J.* 1(6015):931-933; 1976.

1385 HEPATO-NEPHROMEGALIA GLYCOGENICA (GLYCOGEN STORAGE DISEASE OF THE LIVER AND KIDNEYS). (Ger.) Von Gierke, E. (Stadt. Krankenh. Karlsruhe i.B., W. Germany). *Beitr. Pathol.* 158(1): 94-108; 1976.

1386 LIVER FUNCTION AND INH AND PAS METABOLISM IN ADOLESCENTS WITH SIDE-EFFECTS FROM CHEMOTHERAPY FOR TUBERCULOSIS. (Rus.) Tytor, Ya. N.; Koropetsky, V. I. (Ternopol Regional Medical Inst., Ternopol, USSR). *Vrach. Delo* (6):61-64; 1977.

1387 CONSERVATIVE TREATMENT OF CAVO-HEPATIC TRAUMATIC DISINSERTION: REPORT OF ONE CASE. (Fre.) Migliori, G.; Michelangeli, F.; Pras, N.; Fombaron, G.; Inglesakis, J. A. (Hopital Saint-Roch, 5, rue Pierre-Devoluy, 06000 Nice, France). *J. Chir. (Paris)* 113(5/6):487-496; 1977.

1388 SURGICAL MANAGEMENT OF LIVER TRAUMA. (Ger.) Klosoris, E.; Siedek, M.; Kuhr, J.; Kozuschek, W. (Chirurgische Universitatsklinik und Poliklinik, D-5300 Bonn-Venusberg, W. Germany). *Langenbecks Arch. Chir.* 344(1):61-70; 1977.

1389 MINIREVIEW: ENDOTOXIN EFFECTS ON THE LIVER. (Eng.) Utili, R.; Abernathy, C. O.; Zimmerman, H. J. (Veterans Admin. Hosp., Washington, DC 20422). *Life Sci.* 20(4):553-568; 1977.

1390 DIAGNOSIS AND SURGICAL TREATMENT FOR MULTILOCULAR ECHINOCOCCOSIS OF THE LIVER. (Eng.) Kasai, Y.; Sasaki, E.; Tamaki, A.; Koshino, I.; Kakita, A.; Kawanishi, N. (Hokkaido Univ., Sch. Medicine, Sapporo, Japan). *Chir. Gastroenterol.* 10(4):425-428; 1976.

1391 A STUDY OF BILE VISCOSITY IN HEPATOBILIARY DISEASES AND INFLUENCE OF ALTERATION OF BILE VISCOSITY IN VIVO. (Eng.) Nakamoto, M.; Nakayoshi, A.; Sato, Y.; Takahashi, T.; Ide, T.; Nagao, F. (Jikei Univ. Sch. Medicine, Japan). *Chir. Gastroenterol.* 10(4):445-451; 1976.

1392 MULTIFOCAL MALIGNANT HEMANGIOENDOTHELIOMA PRESENTING AS ACUTE HEPATITIS: A CLINICOPATHOLOGIC STUDY. (Eng.) Stein, A. M.; Fawaz, K.; Tabrizi, A.; Blanchard, R.; Hou, S. (New England Medical Center Hosp., 171 Harrison Ave., Boston, MA 02111). *Am. J. Gastroenterol.* 67(4):370-374; 1977.

1393 SUCCESSFUL TREATMENT OF EARLY CANCER OF THE LIVER AND PORTAL HYPERTENSION IN PATIENTS PRESENTING WITH BLEEDING OESOPHAGEAL VARICES. (Eng.) Kobayashi, M.; Inokuchi, K.; Nagasue, N.; Saku, M.; Iwaki, A. (Kyushu Univ. Hosp., Fukuoka 812, Japan). *Br. J. Surg.* 64(8):542-544; 1977.

1394 ANGIOGRAPHIC DEMONSTRATION OF GROWTH OF HEPATOCELLULAR CARCINOMA IN THE HEPATIC

VEIN AND INFERIOR VENA CAVA. (Eng.) Okuda, K.; Jinnouchi, S.; Nagasaki, Y.; Kuwahara, S.; Kaneko, T.; Kubo, Y.; *et al.* (Chiba Univ. Sch. Medicine, Chiba 280, Japan). *Radiology* 124(1):33-36; 1977.

1395 RADIOISOTOPE SCANNING IN EVALUATION OF METASTATIC DISEASE IN THE LIVER. (Eng.) Rozin, R.; Pavlovski, B.; Merhav, A. (Hadassa Hosp., Tel Aviv, Israel). *Abdom. Surg.* 19(7/8):178-180; 1977.

1396 CARCINOMA ARISING IN A LIVER CYST--REPORT OF THREE CASES. (Eng.) Kasai, Y.; Sasaki, E.; Tamaki, A.; Koshino, I.; Kawanishi, N.; Hata, Y. (Hokkaido Univ. Sch. Medicine, Sapporo, Japan). *Jpn. J. Surg.* 7(2):65-72; 1977.

1397 NEW ASPECTS OF CLINICAL HEPATOLOGY. (Ger.) Gerok, W. (Med. Klinik der Universitat, Hugstetter Str. 55, D-7800 Freiburg, W. Germany). *Munch. Med. Wochenschr.* 119(16):529-534; 1977.

1398 LIVER METABOLISM OF DRUGS. (Ita.) Darnis, F. (Hopital Beaujon, 100, Bd. du General Leclerc, 92-110 Clichy, France). *Minerva Med.* 67 (55):3591-3598; 1976.

1399 DIAGNOSTIC ACCURACY OF TRANSUMBILICAL PORTOGRAPHY. (Cze.) Cholt, M.; Kalny, J.; Spatenka, J. (Rentgenologicke pracoviste katedry fakultni pediatrie fakulty detskeho lekarstvi KU, Prague, Czechoslovakia). *Cesk. Radiol.* 31(2):91-98; 1977.

1400 THE USE OF PATHOPHYSIOLOGICAL SYNDROME CHARACTERISITICS FOR EVALUATING THE FUNCTIONAL STATE OF THE LIVER IN CHILDREN. (Rus.) Volkova, A. A. (Gorki Scientific Res. Inst. Pediatrics, Gorki, USSR). *Pediatriia* (3):54-56; 1977.

1401 USE OF ^{131}I-ALBUMIN MICROAGGREGATES FOR THE ASSESSMENT OF PROTEOLYTIC AND PHAGOCYTIC FUNCTIONS OF THE LIVER. (Rus.) Gabuniya, R. I.; Ikonnikov, A. I. (Scientific Res. Inst. Medical Radiology of USSR Acad. Medical Sciences, Obninsk, USSR). *Med. Radiol. (Mosk.)* 22(5):3-7; 1977.

1402 SIGNIFICANCE OF RHEOGRAPHY IN DIAGNOSIS OF CHRONIC NONPROGRESSIVE AND PROGRESSIVE DISEASES OF THE LIVER. (Rus.) Serdyuk, N. N. (Univ. Clinic, Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Ter. Arkh.* 49(5):110-113; 1977.

1403 MANIFESTATIONS OF AUTOIMMUNITY IN CHRONIC LIVER DISEASES. (Cze.) Horejsi, J.; Jezkova, Z.; Svorcova, V.; Novak, J.; Laznicka, M. (Ustav Hematologie a Krevni Transfuze, Prague, Czechoslovakia). *Cas. Lek. Cesk.* 115(37):1146-1149; 1976.

See also, 0895, 0916, 0920, 0958, 0968, 0988, 1089, 1090, 1091, 1092, 1093, 1100, 1104, 1106, 1112, 1113, 1114, 1132, 1133, 1135, 1136, 1137, 1138, 1140, 1142, 1145, 1222, 1231, 1234, 1260, 1271, 1323, 1404, 1422, 1425, 1451, 1458, 1474, 1475, 1478, 1487, 1488, 1506, 1526, 1532, 1537, 1541, 1584, 1623, 1662, 1674, 1676, 1683.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

1404 LIVER DISEASE IN INFANTS. PART II: HEPATIC DISEASE STATES. (Eng.) Mathis, R. K.; Andres, J. M.; Walker, W. A. (Massachusetts Hosp., Boston, MA 02114). *J. Pediatr.* 90(6):864-880; 1977.

A review is presented of the developmental and acquired disorders of bilirubin metabolism (other than hepatic excretory defects) in infants. Noncholestatic jaundice (unconjugated hyperbilirubinemia) of various types (e.g., physiologic jaundice), jaundice due to overproduction of bilirubin, and jaundice due to impaired transport, hepatic uptake or conjugation, or enterohepatic circulation of bilirubin are discussed together with the treatment of these entities. Different types of cholestatic jaundice (conjugated hyperbilirubinemia) are described: idiopathic cholestatic jaundice, inherited cholestatic jaundice (familial hepatocellular cholestasis and metabolic hepatocellular cholestasis), inherited "noncholestatic" jaundice, and acquired cholestatic jaundice. Infectious liver disease of infants (e.g., viral hepatitis, sepsis, and abscess) and iatrogenic liver disease due to chemical liver injury, i.v. alimentation, or injury due to catheter placement in umbilical vessels, or ionizing irradiation are also described. It is suggested that every step in the metabolism of bilirubin can be affected by a spectrum of conditions causing jaundice and that hyperbilirubinemia in neonates and infants should be regarded as abnormal until proven otherwise.

1405 UNCONJUGATED BILIRUBIN AND AN INCREASED PROPORTION OF BILIRUBIN MONOCONJUGATES IN THE BILE OF PATIENTS WITH GILBERT'S SYNDROME AND CRIGLER-NAJJAR DISEASE. (Eng.) Fevery, J.; Blanckaert, N.; Heirwegh, K. P. M.; Preaux, A. M.; Berthelot, P. (Dept. Medical Res., Univ. Leuven, 300 Leuven, Belgium). *J. Clin. Invest.* 60(5):970-979; 1977.

Bilirubin pigments were studied in the bile of 20 normal adults, 25 patients with Gilbert's syndrome, 9 children with Crigler-Najjar disease, and 6 patients with hemolytic diseases (congenital spherocytosis or autoimmune hemolysis), to determine how hepatic bilirubin uridine diphosphate (UDP)-glucuronosyltransferase deficiency affects the end products of bilirubin biotransformation. In bile from patients with Gilbert's syndrome, there was a striking increase in the proportion of bilirubin monoconjugates (48.6 ± 9.8% of total conjugates) relative to that in normal bile (27.2 ± 7.8%). This increase was even more pronounced in children with Crigler-Najjar disease, in whom bile glucuronide was always demonstrated. Furthermore, unconjugated bilirubin-IXα was always present in the bile of these children and amounted to 30-57% of their total bilirubin pigments (<1% in the controls). It was not possible to predict from the biliary bilirubin composition whether a child would respond to phenobarbital therapy. Bile composition was normal in patients with hemolysis, except when there was associated deficiency of hepatic glucuronosyltransferase. Therefore, the observed alterations were not a simple consequence of unconjugated hyperbilirubinemia. The findings suggest that Crigler-Najjar disease represents a more pronounced expression than Gilbert's syndrome of a common biochemical defect. Hepatic bilirubin UDP-glucuronosyltransferase deficiency leads to decreased formation of diconjugates with an ensuing increase in the proportion of bilirubin monoconjugates in bile; in the most severe cases, an elevated content of biliary unconjugated bilirubin is also found.

1406 PHYSIOPATHOLOGICAL AND THERAPEUTIC FEATURES OF GILBERT'S ICTERUS AT THE PRESENT TIME. I. RECENT FINDINGS IN GILBERT'S SYNDROMES. (Ita.) Lovisetto, P.; Giorcelli, W.; Actis, G. C.; Biarese, V. (Istituto di Clinica Medica Generale e Terapia Medica I, Universita degli Studi di Torino, Turin, Italy). *Minerva Med.* 67(35):2253-2265; 1976.

Gilbert's icterus is a term used to describe some forms of free-bilirubin hyperbilirubinemia that are caused by a defect in bilirubin clearance by liver cells. Gilbert's icterus occurs in 4-6% of the population and appears to be an inherited metabolic disturbance in which there is a reduction in glucuronyl transferase activity. In certain individuals, there is an alteration in the capacity of the liver cells to retain bilirubin that has been removed from the blood. Gilbert's icterus is of two types: one with slight bilirubinemia that is a result of defective uptake and one with higher bilirubin that is due to a reduction in glycuronide conjugation. Lysosome-like granules are seen at the biliary pole of the liver in Gilbert's syndrome patients. The role of these granules in the disease process is not known. Clinical examination sometimes reveals slight hepatomegaly and a more or less intense icterus. On laboratory examination, the average life of erythrocytes may be shortened and kinetic studies with free bilirubin or with radiolabeled bilirubin may show alterations in a selected parameter. Most Gilbert's icterus patients are asymptomatic, however.

1407 PHENOBARBITAL PROPHYLAXIS OF NEONATAL HYPERBILIRUBINEMIA: EVALUATION OF A NIGHTLY DOSE. (Eng.) Thomas, C. R. (Southside OB/GYN, Inc., 3530 South Keystone Ave., Suite 111, Indianapolis, IN 46227). *Obstet. Gynecol.* 50(5): 607-610; 1977.

An attempt was made to improve the success of a previously described method of preventing neonatal hyperbilirubinemia. Two hundred twelve women received phenobarbital in a single 30-mg nightly dose from 32 weeks of gestation until delivery, and the incidence of jaundice in their infants was compared with that in the infants of 254 untreated mothers. A 39% reduction in significant hyperbilirubinemia was realized, but this fell far short of previous findings with a larger dose. Premature infants received no apparent protection against jaundice. No mature infants had severe jaundice (>16 mg/100 ml), and the resolution of hyperbilirubinemia in this group was more rapid. No apparent difference in drowsiness or daytime sedation from previous experience was found. Female newborns responded much better (3:1) to prophylaxis. These disappointing results favor a return to the 1-g daily divided dose.

1408 IMPAIRED DRUG CONJUGATION IN SUBJECTS WIT GILBERT'S SYNDROME (GS) [Abstract]. (Eng Kutz, K.; Schulte, A.; Jensen, C.; Gugler, R. (Medizinische Poliklinik, Univ. Bonn, Bonn, W. Germany). *Gastroenterology* 73(5):1229; 1977.

1409 GILBERT'S SYNDROME: THE QUALITATIVE BASI OF THE DISORDER [Abstract]. (Eng.) Gordon, E. R.; Shaffer, E. A.; Pare, P.; Goresky, C. A. (Montreal General Hosp., Montreal, Quebec H3G 1A4, Canada). *Gastroenterology* 73(5):1222; 1977.

See also, 0963, 0964, 1078.

Nonviral Hepatitis and Hepatic Injury

1410 HEPATOTOXICITY OF ANESTHETICS. (Spa.) Hernandez, A. M. (Hospital Provincial, Murcia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47 (6):785-794; 1976.

The metabolism of anesthetics by the liver and the resultant hepatotoxicity of these agents are reviewed. The anatomy and normal physiological functions of the liver are described with special emphasis on drug metabolism. It is concluded that the majority of anesthetics may be considered "protoplasmic poisons." The types of hepatic lesions commonly associated with hepatic diseases and the diagnostic tests for hepatic function are enumerated. The choice of the type of anesthetic to use, particularly for a patient with a disease of the liver, requires careful consideration of the drugs that the liver will metabolize to excrete the anesthetic, and the use of anesthetics that are potentially hepatotoxic (chloroform, halothane, ethoxyfluorane, phenothiazine, and so on) should be avoided.

411 PORPHYRIA CUTANEA PRAEMATURA DUE TO HORMONAL CONTRACEPTIVES. (Ger.) Doss, M. Fach Klinische Biochemie im Fachbereich Humanedizin der Universitat, Pilgrimstein 2, 3550 arburg/Lahn, W. Germany). *Dtsch. Med. Wochenschr.* 02(23):875-877; 1977.

orphyria cutanea tarda (PCT) was diagnosed in four atients following long-term use of hormonal reparations. PCT was due to the use of oral ontraceptives in three 23- to 25-yr-old patients; two ad used Eugynon for 3 and 8 yr, resp., the third, rlest for 3 yr. PCT was also found in a 65-yr-old an who was treated with estrogens for prostate arcinoma. The genealogical investigation of one f the women revealed PCT in her father (probably anifested as a result of chronic alcoholism) and hronic hepatic porphyria type B without dermatoogical signs in her sister. Uroporphyrins were ominant in all patients, accounting for 51-63% f the total porphyrin, while heptacarboxyporphyrin ccounted for 19-43%, hexacarboxyporphyrin for -7%, pentacarboxyporphyrin for <1-7%, coproporhyrin for <1-7%, and tricarboxyporphyrin for up o 1%. The very low incidence of manifest PCT ompared to the large numbers of women using oral ontraceptives and patients treated with estrogens uggests that a defect in uroporphyrinogen ecarboxylase activity is a necessary condition f PCT. The enzymatic disturbance develops radually from the clinically symptom-free initial tages of chronic hepatic porphyria to PCT. ifferentiation between late and early forms of CT is not justified in view of the uniform pathoiochemical findings.

12 QUINIDINE-INDUCED HEPATITIS AND THROMBOCYTOPENIA. (Eng.) Alam, M.; Duvernoy, W. F. C.; Pickard, S. D.; Aronsohn, P. L. (Henry Ford Hosp., 2799 W. Grand Blvd., Detroit, MI 48202). *Henry Ford Hosp. Med. J.* 25(2):53-60; 1977.

The cases of four patients with quinidine-induced hepatitis are presented. Hepatitis was accompanied by malaise, anorexia, fever in two patients, and marked elevation of liver enzymes in all. Two patients had associated quinidine-induced thrombocytopenia of 81,000 and 6,600 platelets/mm^3, resp. Liver biopsy in two patients revealed small foci of hepatocellular necrosis, Kupffer cell hyperplasia, and Kupffer cells containing lipochrome. In one patient, noncaseous granulomatous lesions were seen. Symptoms subsided and laboratory tests returned to normal rapidly on withdrawal of quinidine. In one patient, drug challenge reproduced symptoms and abnormal liver function test results. Quinidine-induced hepatitis is probably more frequent than recognized heretofore and may be associated with quinidine-induced thrombocytopenia.

1413 ACUTE LEAD POISONING--AN UNUSUAL CAUSE OF HEPATITIS [Abstract]. (Eng.) Beattie, A. D.; Mullin, P.; Baxter, R.; Moore, M. R. (Southern General Hosp., Glasgow, Scotland). *Gut* 18(11):A968; 1977.

1414 HALOTHANE-RELATED HEPATITIS: CLINICAL SPECTRUM AND ROLE OF STEROID THERAPY [Abstract]. (Eng.) Varma, R. R.; Michelsohn, N. (Milwaukee County General Hosp., Milwaukee, WI). *Clin. Res.* 25(4):575A; 1977.

1415 ACETAMINOPHEN AND HEPATIC DYSFUNCTION IN INFECTIOUS MONONUCLEOSIS. (Eng.) Rosenberg, D. M.; Meyer, A. A.; Manning, I. H., Jr.; Neelon, F. A. (Natl. Heart, Lung, and Blood Inst., Bldg. 10, Room 6N260, Bethesda, MD 20014). *South. Med. J.* 70(6):660-661; 1977.

See also, 0966, 1365, 1625, 1634.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

1416 HEPATITIS A AND HEPATITIS B: DIFFERENTIAL CLINICAL, EPIDEMIOLOGICAL AND IMMUNOLOGICAL FEATURES. (Ita.) Ortana, L.; Pizzigallo, E.; Federico, G.; Camilli, G.; Laghi, V. (Istituto di Clinica Malattie Infettive, Universita Cattolica del Sacro Cuore, Rome, Italy). *Minerva Med.* 68(1): 13-28; 1977.

A study is presented of 136 patients with viral hepatitis. Radioimmunoassay of hepatitis B surface antigen (HBsAg) revealed that 58 were HBsAg positive and 78 were HBsAg negative. Mussels were responsible for the transmission of viral hepatitis in 33.33% of the HBsAg-negative group. The oral-fecal route of transmission was implicated in 85.9% of HBsAg-negative cases and 48.2% of HBsAg-positive cases. The average course of disease in hepatitis B and A, resp., was 51.7 and 36 days. Comparative determinations of the levels of transaminases, bilirubin, immunoglobulins, and complement revealed variations in behavior between two types of hepatitis. On the other hand, cellular immunity, studied by the E-rosette technique, appeared depressed in the initial phase of illness in both types of hepatitis, with return to normal upon clinical cure. Clinical cures in less than 60 days were achieved in 71.7% of the HBsAg-negative cases compared to 63.4% of the HBsAg-positive cases; indirect hyperbilirubinemia persisted in 3.7% and 6.8% of the HBsAg-negative and -positive cases, resp. Clinical cures in more than 60 days were achieved in 10.2% and 18.9% of HBsAg-negative and -positive cases, resp., with persistent indirect hyperbilirubinemia in 5.1% and 1.6% of the cases, resp. Continued elevation of transaminase levels were found in 8.9% and 6.8%, resp., of the HBsAg-negative and -positive subjects, who were dismissed from observation without further follow-up. The percentage of complete cures are about equal in the two types of hepatitis, although recovery is significantly faster in hepatitis A (HBsAg-negative hepatitis).

1417 ACUTE HEPATITIS: A PROGNOSTIC STUDY WITH OBSERVATION TIME UP TO 37 YEARS: A FOLLOW-UP STUDY OF THE IVERSEN/ROHOLM LIVER BIOPSY MATERIAL. (Eng.) Dietrichson, O.; Zoffmann, H.; Christoffersen, P.; Hilden, M.; Juhl, E.; Thomsen, A. C. (Kommunehospitalet, Copenhagen, Denmark). *Acta Med. Scand.* 202(4):271-276; 1977.

A follow-up study of 147 patients who had had hepatitis was performed 15-37 yr after the diagnostic biopsy, based on repeated liver biopsies, biochemical liver tests, autopsy reports, and death certificates. Two patients died from acute liver failure, and the development of cirrhosis was documented or strongly suspected in 22 patients. A comparison between these 24 patients and 86 patients with uncomplicated disease revealed a significantly larger number of women (79% versus 38%), a higher age (median 57 versus 40 yr), and more cases with piecemeal necrosis (83% versus 52%), confluent necrosis (54% versus 26%), and marked portal inflammation (83% versus 43%) at the time of the initial liver biopsy in the group with the poor prognosis. The results indicate that the prognosis can be determined by clinical and histological examination in patients with acute hepatitis.

1418 ACUTE VIRAL HEPATITIS IN ITALY: RESULTS OF A COLLABORATIVE STUDY. (Eng.) Guisti G.; Ruggiero, G.; Galanti, B.; Piccinino, F.; Sagnelli, E.; Lucchelli, P. E. (Univ. Naples, 1st Medical Sch. Naples, Naples, Italy). *Acta Hepatogastroenterol.* 24(4):226-237; 1977.

The etiological and clinical aspects of viral hepatitis were evaluated by a retrospective survey of 2,788 hospitalized Italian patients. Ninety percent of the patients had not been treated with steroids. For each case, the clinical and biochemical data were recorded, coded, computerized, a statistically analyzed. Viral hepatitis was more frequent among young patients (mean age, 26.3 yr; age range 1-75 yr; age range of highest incidence, 6-10 yr) and among men (male/female ratio, 1.26). The major factors affecting the severity of illness were age, sex, hepatitis B surface antigen (HBsAg), and transmission by blood transfusion. Both HBsAg-positive patients and older patients had deeper jaundice ($p<0.001$), longer hospitalization ($p<0.001$), higher rates of mortality, and more frequent progression to chronicity. Men had more prolonged jaundice, antigenemia, and hospitalization and a higher frequency of biochemic relapses. Furthermore, men predominated among those patients who progressed to chronicity or died of acute liver failure. In all age groups irrespective of the presence of serum HBsAg, post-transfusion hepatitis was more severe (deeper jaundice, longer hospitalization, and more frequent biochemic relapses, $p<0.01$ for all) than nontransfusion hepatitis. The death rate for all patients was 0.5% but was greater in men (0.64%), in patients over 50 yr of age (1.74%), and in transfused patients (1.58%). The lowest death rate (0.13%) was observed in children age 6-15. Age, sex, presence or absence of HBsAg, and history of blood transfusion were examined for interrelationships, and significant correlations for pairs of these parameters are given. Type B hepatitis was confirmed to be an occupational hazard for surgeons and nurses, consistent with previous observations. The need for prospective studies of viral hepatitis to permit accurate evaluation of outcome is stresse

1419 HEPATITIS B IN WARD AND CLINICAL LABORATORY EMPLOYEES OF A GENERAL HOSPITAL. (Eng.) Levy, B. S.; Harris, J. C.; Smith, J. L.; Washburn, J. W.; Mature, J.; Davis, A.; *et al.* (128 Hollis St., Sherborn, MA 01770). *Am. J. Epidemiol.* 106(4):330-335; 1977.

A sharp increase in viral hepatitis cases, mostly type B, among the 2,000 employees of a general hospital during 3 yr was investigated. Of the 38 cases, 22 occurred in nonphysician, ward employees. Of 189 current ward employees, 8% had antibody to hepatitis B surface antigen (anti-HBs) and 1% had hepatitis B surface antigen (HBsAg). Hepatitis B virus (HBV) seropositivity was highest for employees who worked closely with hemodialysis and renal transplant patients and for those who claimed that their ward was understaffed. Nine of the 38 cases occurred in clinical laboratory workers. Of 70 current laboratory employees, 17% were positive for anti-HBs and none for HBsAg. HBV seropositivity was highest for those working in the chemistry section (highest there among those performing blood-gas determinations and those working with the multichannel autoanalyzers) and those who routinely got blood on their skin and clothes at work. All seropositive employees worked routinely with blood. These data support the hypotheses that many hospital employees contract hepatitis B from exposure to HBsAg-positive patients and that many clinical laboratory employees contract it from exposure to HBV-contaminated blood.

1420 HEPATITIS-B VIRUS INFECTION IN ANAESTHETISTS.

(Eng.) Carstens, J.; Macnab, G. M.; Kew, M. C. (Baragwanath Hosp., Johannesburg, South Africa). *Br. J. Anaesthesiol.* 49(9):887-889; 1977.

To determine whether anesthetists are at risk of developing hepatitis B virus (HBV) infection from their patients, 95 anesthetists working with black South Africans (who have a high prevalence of hepatitis B antigenemia) were questioned about attacks of viral hepatitis, and their blood was tested for hepatitis B surface antigen (HBsAg) and antibody (anti-HBs) by radioimmunoassay. Anti-HBs was detected in the sera of 17.9% anesthetists, but none was a chronic carrier of HBsAg. Two anesthetists had acute viral hepatitis during their careers, one of whom is now positive for anti-HBs. Forty-five of the anesthetists (47.4%) were known to have anesthetized patients with HBs antigenemia, and of these seven were anti-HBs-positive. Anesthetists working with a population having a high carrier rate of HBV appear to be more at risk from HBV infection than the general population.

1421 SERUM ALPHA-FETOPROTEIN LEVELS IN PATIENTS WITH ACUTE AND CHRONIC LIVER DISEASE: RELATION TO HEPATOCELLULAR REGENERATION AND DEVELOPMENT OF PRIMARY LIVER CELL CARCINOMA.

(Eng.) Eleftheriou, N.; Heathcote, J.; Thomas, H. C.; Sherlock, S. (Royal Free Hosp., London NW3 2QG, England). *J. Clin. Pathol.* 30(8):704-708; 1977.

Serial serum alpha-fetoprotein determinations were carried out in 58 patients with acute liver damage to assess the value of this test as a marker of hepatocellular regeneration. One hundred sixty-three patients with chronic liver disease were also examined to determine whether this method of alpha-fetoprotein determination is of value in predicting the development of primary liver cell carcinoma. Using a radioimmunoassay technique, serum alpha-fetoprotein was detected in 50 healthy adults in concentrations of less than 20 μg/l. Among 44 patients with acute viral hepatitis, 43% exhibited a transient rise of serum alpha-fetoprotein, the peak occurring 8-9 days after the maximum recorded serum aspartate transaminase activity. Eight patients with paracetamol-induced liver injury were also shown to have transiently raised levels, the peak occurring earlier than in subjects with viral hepatitis. Six subjects with fatal fulminant hepatitis were studied; the three with the more protracted illness were noted to have increased levels before death. Twenty patients with chronic liver disease also had elevated serum alpha-fetoprotein concentrations (>20 μg/l, <500 μg/l). In four, primary liver cell cancer developed; in two of these the serum alpha-fetoprotein levels rose progressively, and in two it remained raised but at low levels. The observations in the patients with paracetamol-induced liver injury suggest a correlation between the degree of liver cell necrosis and subsequent alpha-fetoprotein production. The increase in serum alpha-fetoprotein in fulminant hepatitis may be related to the duration of illness regardless of the final outcome. Steadily increasing levels are highly suspicious of the development of primary liver cell carcinoma in patients with chronic liver disease.

1422 HBAg-POSITIVE CHRONIC LIVER DISEASE ASSOCIATED WITH CIRRHOSIS AND HEPATOCELLULAR CARCINOMA IN THE SENOI.

(Eng.) Sumithran, E.; Prathap, K. (Dept. Pathology, Univ. Malaya, Kuala Lumpur, Malaysia). *Cancer* 40(4):1618-1620; 1977.

To confirm the high incidence of primary hepatocellular carcinoma (PHC) among the Senoi, a Malaysian aborigine group, all tumors diagnosed by histologic examination of surgical and necropsy material from a local hospital over a 13-yr period were reviewed, and the presence of hepatitis B surface antigen (HBsAg) was assessed in paraffin sections of all livers from the necropsied cases. PHC was present in 10 of 22 Senoi patients with cirrhosis. All 22 livers contained hepatocytes that stained with Shikata's orcein stain and specific immunoperoxidase and immunofluorescent stains for HBAg. This observation raises the strong possibility that hepatitis B may be an important etiologic factor in the development of cirrhosis and PHC in the Senoi. The reason for the high susceptibility of the Senoi for hepatitis B virus infection is not clear, and the role of aflatoxin in the pathogenesis of PHC in the Senoi has yet to be determined. That the Senoi are a numerically small community, maintaining their own unique dietary and social customs and living in readily accessible areas in the Malaysian jungle, makes them an ideal population for the study of factors in the etiology of liver cancer.

1423 HEPATITIS-ASSOCIATED LIPID STORAGE MYOPATHY.

(Eng.) Patten, B. M.; Shabot, J. M.; Alperin, J.; Dodson, R. F. (Baylor Coll. Medicine, Houston, TX 77030). *Ann. Intern. Med.* 87(4):417-421; 1977.

The case of a 23-yr-old woman who developed severe myalgias in association with mild hepatitis B surface antigen-positive hepatitis is presented. Muscle biopsy showed myriads of microvacuoles filled with neutral lipid. Prednisone therapy (40 mg/day) was associated with complete clearing of all clinical and laboratory abnormalities. Since muscle carnitine levels were normal before treatment, it is concluded that infection with hepatitis virus may induce noncarnitine-deficient lipid storage myopathy in man.

1424 THE LIVER DURING AND AFTER FULMINANT HEPATITIS. (Eng.) Horney, J. T.; Galambos, J. T. (Emory Univ. Sch. Medicine, 69 Butler St., S.E., Atlanta, GA 30303). *Gastroenterology* 73(4): 639-645; 1977.

To study changes in liver histology during and after fulminant hepatitis, biopsies were obtained 5 to 14 days after onset of grade 3 or 4 coma, in 15 consecutive patients who recovered from fulminant hepatitis. In nine patients, follow-up biopsy was obtained 6 to 60 months after acute hepatitis, and autopsy was performed in two patients who died in 4 months from complications of hepatitis (aplastic anemia) or of corticosteroid therapy (sepsis). During fulminant illness, the biopsy findings were multilobular necrosis in four patients, confluent (bridging) necrosis in nine, and only portal inflammation in one. The duration or the grade of coma did not correlate with the severity of necrosis on the biopsy. Follow-up biopsy showed development of chronic (active) hepatitis in three of nine patients (with cirrhosis in one of these). Chronic liver disease was not found in the two autopsies. If fulminant hepatitis is the result of vigorous cell-mediated immune attack on hepatocytes, then this process cannot always eradicate chronic hepatitis B surface antigenemia, nor can it always prevent the development of chronic (active) hepatitis or cirrhosis.

1425 LIVER-SPECIFIC PROTEINS AND AUTOIMMUNITY IN INFLAMMATORY LIVER DISEASE. (Ita.) Alberti, A.; Realdi, G.; Bortolotti, F.; Trevisan, A.; Tremolada, F.; Rigoli, A. (Istituto di Medicina Clinica, Cattedra di Patologia Medica dell'Universita degli Studi di Padova, Padua, Italy). *Boll. Ist. Sieroter. Milan.* 55(5):411-425; 1976.

Cellular immune reactions against liver-specific proteins (LP$_1$) were studied by the leukocyte migration inhibition test in patients with different kinds of liver disease. Sixty-six percent of patients with chronic active hepatitis showed cellular immunity to LP$_1$. There was no difference in reactivity in patients who were serum positive for hepatitis B antigen (HBAg) and those who were HBAg-negative. Fifty-seven percent of patients with viral hepatitis B who tested in the acute phase of the disease had immunity to LP$_1$. After 6-12 months, only 17.8% of these same patients were still LP$_1$ positive Inhibition of leukocyte migration appears to decrease in these patients as virus is cleared from the liver. Inhibition of leucocyte migration was also found in 80% of HBAg-positive patients with chronic persistent hepatitis and in 23% of asymptomatic carriers of HBAg, most of whom progressed to cases of chronic active hepatitis. The cell-mediated immune response appears to play a major role in the pathogenesis of chronic active hepatitis. Infection with the hepatitis B virus must also be considered as a possible cause of autoimmune liver disease.

1426 LYMPHOCYTE POPULATIONS IN HBAg-POSITIVE ACUTE HEPATITIS. (Ita.) Bianchi, F. B.; Zauli, D.; Marchesini, G.; Gritti, F. M.; Fabbri, L.; Pisi, E. (Istituto Patologia Medica, Universita di Bologna, Bologna, Italy). *Minerva Gastroenterol.* 22(3):251-252; 1976.

T and B lymphocyte levels were determined in 11 patients with acute hepatitis and 21 patients with chronic uremia who were being treated with renal dialysis. All of the acute hepatitis patients and 11/21 uremia patients were seropositive for hepatitis B antigen (HBAg). There was a significant reduction in the numbers of circulating lymphocytes and monocytes in all HBAg-positive patients. The absolute numbers and the percentage of circulating B lymphocytes increased from 674 ± 120 cells/cm^3 or 27.0 ± 4.0% in controls to 885 ± 303 cells/cm^3 or 42.7 ± 9.6% in hepatitis patients; the increase in absolute number was not significant, whereas the percentage increase was significant ($p<0.001$). The absolute number and percentage of circulating T lymphocytes decreased significantly in all patients, especially in HBAg-positive uremia patients in whom values fell from 1,567 ± 428 cells/cm^3 or 65.5 ± 8.0% in the controls to 844 ± 434 cells/cm^3 or 45.6 ± 15.3%. The lymphopenia that occurs in the early stages of viral hepatitis is the result of a reduction in the number of circulating T lymphocytes. This reduction in the uremia patients is a reflection of the inhibitory action of uremia on the immune response.

1427 HUMORAL AND CELLULAR IMMUNE REACTIONS AGAINST HBsAg AND AGAINST LIVER-SPECIFIC PROTEINS IN THE COURSE OF ACUTE AND CHRONIC HEPATITIS. (Ita.) Realdi, G.; Alberti, A.; Bortolotti, F.; Tremolada, F.; Diodati, G.; Cadrobbi, P. (Clinica Medica Generale dell'Universita di Padova, Padova, Italy). *Minerva Gastroenterol.* 22(3):207-212; 1976.

Cell-mediated immunity against liver specific protei (LSP) and hepatitis B surface antigen (HBsAg) was studied by means of the leukocyte migration inhibition test in 80 patients and 20 control subjects. Twenty-two patients had acute viral hepatitis B (AVHB), 12 had chronic persistent hepatitis (CPH), 15 had chronic active hepatitis (CAH) and were seropositive for hepatitis B antigen (HBAg), 16 had CAH and were HBAg-negative, and 15 had alcoholic cirrhosis. LSP was found in 54%, 53%, 75%, and 16% of patients with AVHB, (HBAg-positive) CAH, (HBAg-negative) CAH, and CPH, resp. Cirrhotic patients an controls were LSP-negative. In CAH patients treated with prednisone, there was a reduction in the autoimmune response, while untreated patients remained

SP-positive over a 12-month period. Although 50%
f AVHB patients were LSP-positive in the acute
hase of their disease, only 10% were still positive
-12 months later. Thirty-one percent of HBAg-
ositive CAH patients exhibited cellular immunity
o HBsAg. In the acute disease phase, 51% of AVHB
atients had cell-mediated immunity to HBsAg; cel-
ular immunity appeared in 83% after 3 months and
n 58% after 12 months. Antibody (Ab) to HBsAg in
hese patients was low in the acute phase, but
limbed steadily from 3-12 months, by which time
0% were HBsAb positive. The autoimmune reaction
o LSP in AVHB patients is most likely a result of
embrane protein alteration by the virus. Sensi-
ivity to LSP is limited and disappears with the
learance of the virus from the body. In HBAg-
ositive CAH patients, the virus persists in the
ody, and autoimmunity to LSP persists also. HBAg-
egative CAH is a classic autoimmune disease, which
ay be initiated by viruses, drugs, or other ex-
ernal agents; cell-mediated immunity to HBsAg in
his disease suggests previous contact with the HB
irus in some patients. It is also suggested that
element of genetic predisposition to this auto-
mune disease may exist.

28 CORRELATION BETWEEN TITER OF ANTIBODY TO HEPATITIS B CORE ANTIGEN AND PRESENCE VIRAL ANTIGENS IN THE LIVER.

(Eng.) Kojima,
; Udo, K.; Takahashi, Y.; Yoshizawa, H.; Tsuda,
; Itoh, Y.; *et al.* (Gifu Prefectural Hosp.,
fu-ken, Japan). *Gastroenterology* 73(4):664-667;
77.

an effort to find a reliable indicator of per-
stent hepatitis B virus (HBV) infection, markers
HBV infection in the serum were correlated with
e presence of both hepatitis B core antigen
BcAg) and hepatitis B surface antigen (HBsAg) in
e livers of 31 autopsied patients with liver
rrhosis. Liver specimens were stained for HBcAg
d HBsAg by the direct immunofluorescence method.
l specimens had detectable levels of antibody to
cAg (anti-HBc). Their premortem serum samples
re tested for HBsAg, antibody to HBsAg (anti-HBs),
d anti-HBc. Persistent (HBV) infection, as
dged by circulating and/or liver hepatitis B
tigens, was identified in 18 patients, and all of
em revealed a high titer of anti-HBc ranging from
^{1} to 2^{16} by the immune adherence hemagglutina-
on method. In contrast, the anti-HBc titer of
e remaining 13 patients without detectable HB
tigens, was less than 2^{9}, and the geometric mean
ter of anti-HBc of the patients with persistent
infection was significantly higher than that of
e patients without (13.9 ± 1.55 versus 7.23 ±
0; *t* test, $p<0.001$). A combination of circu-
ting anti-HBs and hepatic HB antigens was found
one patient, whose serum revealed an anti-HBc
ter of 2^{12}. A high titer of anti-HBc in the
rum (immune adherence hemagglutination titer $\geq 2^{11}$)
ems to be a reliable indicator of persistent
infection in the liver.

29 EXPRESSION OF HEPATITIS B VIRUS-SPECIFIC MARKERS IN ASYMPTOMATIC HEPATITIS B SURFACE ANTIGEN CARRIERS.

(Eng.) Hess, G.; Arnold, W.; Shih, J. W. K.; Kaplan, P. M.; Purcell, R. H.; Gerin, J. L.; *et al.* (Second Dept. Internal Medicine, Univ. Mainz, 6500 Mainz, W. Germany). *Infect. Immun.* 17(3):550-554; 1977.

The state of hepatitis B virus infection was assessed in 22 asymptomatic hepatitis B surface antigen (HBsAg) carriers. The presence of serum hepatitis B e antigen (HBeAg) was closely associated with serum HBsAg-specific DNA polymerase activity, hepatitis B core antigen (HBcAg) in serum and liver cell nuclei, and a histological picture of chronic hepatitis. No HBsAg-specific DNA polymerase activity or HBcAg was detected in highly concentrated sera positive for antibody to HBcAg. In addition, liver biopsy specimens from carriers with antibody to hepatitis B e antigen (anti-HBe) were negative for HBcAg by immunofluorescence, and the liver histology was either normal or revealed only fatty changes. These data indicate that the anti-HBe-positive sera contained either no Dane particles or, if present, at least a 500-fold lower concentration of Dane particles than that found in HBeAg-positive sera.

1430 A DIRECT IMMUNOFLUORESCENCE METHOD FOR THE DETECTION OF HEPATITIS B CORE ANTIGEN IN FORMALIN-FIXED AND GELATIN-EMBEDDED LIVER SPECIMENS.

(Eng.) Yoshizawa, H.; Itoh, Y.; Akahane, Y.; Tsuda, F.; Miyakawa, Y.; Mayumi, M. (Tokyo Metropolitan Inst. Medical Science, Bunkyo-ku Tokyo 113, Japan). *J. Clin. Pathol.* 30(8):776-778; 1977.

A simple method for detecting hepatitis B core antigen (HBcAg) in formalin-fixed liver specimens by direct immunofluorescence is reported. Liver tissue was obtained at necropsy from patients with various hepatic diseases and was fixed and stored in 10% formalin. The specimens are washed free of formalin in tap water for 12 hr and incubated in distilled water containing 0.01% NaN_3 and 5% gelatin at 37 C for 12 hr, and successively in water supplemented with 10% gelatin at 37 C for 4 hr. The specimens are transferred to a Petri dish filled with 10% gelatin at 37 C, and the dish is allowed to consolidate at room temperature. The specimens are then snap-frozen in n-hexane. In one specimen from a patient with liver cirrhosis, HBcAg-positive immunofluorescence was exclusively localized in the nucleus. About 80% of the hepatocytes were positive with a clear bright fluorescence and virtually no background staining. The staining of hepatitis B surface antigen (HBsAg) was localized in the cytoplasm, and no nuclear fluorescence was observed. The detectability of both HBcAg and HBsAg by the direct immunofluorescence method was similar in fixed and unfixed specimens embedded in gelatin. The basis for the success of this method is apparently the embedding process, with which the dehydration process for embedding in paraffin is avoided.

1431 SOLID PHASE RADIOIMMUNOASSAY FOR QUANTITATING ANTI-HBs IN HEPATITIS B IMMUNE

GLOBULIN. (Eng.) Ratliff, E. A.; Pollack, W.; Tripodi, D.; Ho, T. (Ortho Res. Inst. Medical Sciences, Raritan, NJ 08869). *Int. Arch. Allergy Appl. Immunol.* 54(3):231-237; 1977.

A solid-phase radioimmunoassay technique was modified to quantitate the antibody in hepatitis B immune globulin. This procedure allows the data to be resolved into a Sips adsorption isotherm. This treatment of data permits the total antibody, intrinsic average binding constant, and index of heterogeneity to be determined, since it was demonstrated that the antibody behaves as if it is monovalent with respect to binding its antigen. Two assay procedures based upon different methods of measuring nonspecific binding are described. In the first, a labeled control globulin known to be free of antibody to hepatitis B surface antigen is used. In the second assay procedure, buffer-treated tubes are used as the "negative" control. The methods were found to give indistinguishable results, but the authors believe that the latter will offer the greatest utility.

1432 PRESENCE OF HBsAg AND IgG ON THE LIVER CELL MEMBRANE IN PATIENTS WITH ACUTE AND CHRONIC HEPATITIS. (Ita.) Alberti, A.; Realdi, G.; Tremolada, F.; Rigoli, A. M.; Fattovich, G.; Spina, G. P. (Clinica Medica Generale, Univ. Padova, Padua, Italy). *Minerva Gastroenterol.* 22(3):235-240; 1976.

The presence of the hepatitis B antigen (HBAg) and IgG on the surface of hepatocytes from patients with acute and chronic hepatitis was determined by immunofluorescence. Ten patients with acute hepatitis B were examined during the first week of illness. Seven of these 10 had HBAg at the cell surface and 5/10 had intracellular HBAg. An additional 13 patients with acute hepatitis B were examined during the recovery phase of the disease. None of these patients had HBAg on the cell surface, but 33% of them had intracellular HBAg. Five patients with chronic persistent hepatitis B were studied also. Two of these five were seropositive for HBAg. One of the seropositive patients had intracellular HBAg. Fifteen patients with chronic active hepatitis (CAH) were also studied. Eight patients were seropositive and seven were seronegative for HBAg. All of the positive patients had HBAg located within the cell but not at the cell surface. None of the seronegative CAH patients had intracellular IgG. Surface IgG was found in 10% of the acute hepatitis B patients examined in the first week of the study and 7.6% of these examined in the recovery phase; 75% of the seropositive and 57% of the seronegative CAH patients also had surface IgG. All of the other patients were negative for surface IgG. Five patients with alcoholic cirrhosis and 4 normal controls were negative for both HBAg and IgG at both locations. These results suggest that in patients with acute hepatitis B, cellular immune reactions are perhaps responsible for cell lysis and the elimination of both infected cells and the antigenic organism. In CAH patients, cellular antibodies are probably directed against diverse antigens.

1433 e ANTIGEN AND ANTIBODY IN OUTBREAKS OF HEPATITIS B IN TWO RENAL DIALYSIS UNITS. (Eng.) Gibson, P. E. (Central Public Health Lab., Colindale Ave., London NW9 5HT, England). *J. Clin. Pathol.* 30(8):717-719; 1977.

In two renal dialysis units that had outbreaks of hepatitis B, patients were studied for the presence of e antigen and antibody. In one unit, in which the illness was mild and most of the 27 patients (78%) became carriers of hepatitis B surface antige (HBsAg), all but one patient had e antigen. Most of the HBsAg carriers had persisting e antigen, and most of the transient patients had also transient e antigen. In the other unit, in which the illness was more severe, none of the 10 patients became a carrier. Only 30% had e antigen during the acute phase of illness and 40% developed anti-e just before clearing HBsAg. The differences between these two units may reflect strain differences in the infectivity of hepatitis B virus.

1434 HEPATITIS B e ANTIGEN AND ANTIBODY ACTIVITY IN HEPATITIS B VIRUS INFECTION. (Eng.) Tiku, M. L.; Makhdoomi, G. M.; Beutner, K. R.; Nath, N.; Ogra, P. L. (Children's Hosp., 219 Bryant St., Buffalo, NY 14222). *J. Pediatr.* 91(4): 540-544; 1977.

Groups of institutionalized subjects, volunteer blood donors with serologic evidence of asymptomati hepatitis B virus infection, and patients with acut type B viral hepatitis were studied for the presence of hepatitis B e antigen (HBeAg) and antibody (anti-HBe) in a sequential manner over 2-3 yr. HBeA was detected in 9.5% of 226 institutionalized residents and 105 volunteer blood donors and in 24% of 46 patients with acute type B viral hepatitis. HBeAg-positive subjects frequently had persistently elevated SGPT levels. Anti-HBe activity was observ in 26% to 32% of subjects positive for hepatitis B surface antigen (HBsAg). Long-term follow-up indicated that HBsAg-positive subjects with anti-HBe did not eventually become seronegative for HBsAg.

1435 EVALUATING THE SEVERITY OF VIRAL HEPATITIS USING A COAGULOGRAM. (Rus.) Sorinson, S. N.; Zhdakova, I. N. (Gorki Medical Inst., Gorki, USSR). *Sov. Med.* (5):27-30; 1977.

1436 HEPARIN IN THE TREATMENT OF SEVERE FORMS OF VIRAL HEPATITIS. (Rus.) Pateyuk, V. G.; Fedyanina, Yu. P. (Chita Medical Inst., Chita, USSR). *Sov. Med.* (5):33-36; 1977.

1437 MEASURES TO CONTROL VIRAL HEPATITIS. (Rus.) Stepanov, G. P.; Bondarenko, M. P. (Central Scientific Res. Inst. Epidemiology, Ministry Health USSR, Moscow, USSR). *Sov. Med.* (5):125-129; 1977.

1438 METHOD FOR THE IDENTIFICATION OF AUSTRALIA ANTIGEN USING THE COUNTER IMMUNOELECTRO-PHORESIS INHIBITION TEST. (Rus.) Gelemey, V. P. (Lvov Medical Inst., Lvov, USSR). *Lab. Delo* (6):353-356; 1977.

1439 INVESTIGATION OF BLOOD SERUM PROTEINS IN PATIENTS WITH ACUTE VIRAL HEPATITIS USING THE METHOD OF DISC ELECTROPHORESIS IN POLY-ACRYLAMIDE GEL. (Rus.) Levina, L. D.; Ambalov, Yu. M.; Kartashev, V. V. (Rostov Medical Inst., Rostov, USSR). *Klin. Med.* 55(2):126-131; 1977.

1440 AUSTRALIA ANTIGEN AND VIRAL HEPATITIS: CLINICAL AND STATISTICAL CONSIDERATIONS. (Ita.) Menicagli, V.; Pardelli, G. C. (Spedali Riuniti, Livorno, Italy). *Minerva Med.* 68(12): 769-772; 1977.

441 SHORT ALTERNATING CORTICOTHERAPY WITH SINGLE DOSES AT 48-HOUR INTERVALS IN CUTE VIRAL HEPATITIS. (Rum.) Caruntu, F.; ngelescu, C.; Predoviciu, F. (Spitalul clinic e boli infectioase "Colentina," Bucharest, umania). *Med. Interna* 28(3):205-210; 1976.

442 REACTION OF ALLERGENOLEUKOCYTOLYSIS IN VIRAL HEPATITIS (SERUM HEPATITIS). (Rus.) yntya, V. E. (Kishinev Medical Inst., Kishinev, SSR). *Ter. Arkh.* 48(12):45-48; 1976.

443 MANAGEMENT OF TYPE B VIRAL HEPATITIS. (Fre.) Rousseau, C. (Centra Hospitalier e l'Universite Laval, 2705, boul. Laurier, Quebec 1V 4G2, Canada). *Union Med. Can.* 106(3):351-355; 977.

44 SIGNIFICANCE OF AUSTRALIA ANTIGEN IN THE DIFFERENTIAL DIAGNOSIS AND PROGNOSIS F HEPATITIS. (Ger.) Baenkler, H. W. (Institut nd Poliklinik fur Klinische Immunologie der niversitat, Krankenhausstrasse 12, 852 Erlangen, . Germany). *Fortschr. Med.* 95(9):577-579; 1977.

45 PERIPHERAL BLOOD LYMPHOCYTE POPULATIONS IN VIRAL HEPATITIS. (Pol.) Celinska-cpytko, E.; Wolko, K.; Mackiewicz, S. (Acad. edicine, Poznan, Poland). *Pol. Arch. Med. Wewn.* (2/8):113-118; 1976.

46 EMETINE IN THE TREATMENT OF VIRAL HEPATITIS. (Cze.) Kosina, F.; Truksova, (Krajska nemocnice, 400 43 Usti nad Labem, echoslovakia). *Cas. Lek. Cesk.* 115(47):1454-57; 1976.

1447 PATHOGENETIC MECHANISMS OF HYPERBILIRUBIN EMIA IN WOMEN WITH VIRAL HEPATITIS. (Rus.) Yatsenko, L. A. (Medical Inst., Ordzhonikidze, USSR). *Sov. Med.* (5):30-32; 1977.

1448 HEPATITIS B ANTIGEN IN THE DIAGNOSIS AND COURSE OF VIRAL HEPATITIS IN PREGNANT WOMEN. (Ger.) Boron, P.; Bobrowska, E.; Boron-Kaczmarska, A.; Grabianska, A.; Karwowska, K.; Szpakowicz, T.; Rzewnicki, I. (Medizinischen Akademie in Bialystok, VR Polen, ul. Zurawia 14, 15-540 Bialystok, Poland). *Dtsch. Gesundheitsw.* 32(28):1310-1312; 1977.

1449 EPIDEMIOLOGICAL AND CLINICAL ARGUMENTS CONCERNING THE PROGNOSIS OF VIRAL HEPATITIS. (Fre.) Pariente, E.; Laverdant, C. (Clinique Medicale B, H.I.A. Begin, 69 avenue de Paris, F 94160 Saint-Mande, France). *Med. Armees* 4(2):105-110; 1976.

1450 DIAGNOSTIC COEFFICIENTS FOR DIFFERENTIATING INFECTIOUS AND SERUM HEPATITIS. (Rus.) Titov, M. B.; Gerasun, B. A.; Grinbaum, A. S.; Germaniuk, I. L. (Lvov Medical Inst., Lvov, USSR). *Vrach. Delo* (5):146-150; 1977.

1451 ANTI-GAMMAGLOBULIN FACTORS, IMMUNOGLOBULIN M, AND AUSTRALIA ANTIGEN IN ACUTE AND CHRONIC ACUTE VIRAL HEPATITIS. (Ita.) Tigano, F.; Ferlazzo, B.; Barrile, A.; Caruso, R. (Via Risorgimento, 172, 98100 Messina, Italy). *Prog. Med.* 32(14):562-568; 1976.

1452 SYNDROME OF NEONATAL HEPATITIS [Abstract]. (Eng.) Licastro, R.; Ciocca, M. (No affiliation given). *Arq. Gastroenterol.* 14(3): 160-161; 1977.

1453 ACUTE HEPATITIS--CLINICAL, HUMORAL AND HYSTOLOGIC [sic] COURSE [Abstract]. (Eng.) Licastro, R.; Ciocca, M.; Ramonet, M.; Costa, J. A. (No affiliation given). *Arq. Gastroenterol.* 14(3): 162; 1977.

1454 DISTURBED CELL-MEDIATED IMMUNITY IN LIVER DISEASE: CAUSE OR EFFECT [Abstract]? (Eng.) Cowlishaw, J. L.; Smith, C. I.; Bui, C. T.; Cooksley, W. G. E.; Campbell, C. B.; Halliday, J W.; Powell, L. W. (Dept. Medicine, Univ. Queensland, Brisbane, Australia). *Clin. Exp. Pharmacol. Physiol.* 4(5):465-466; 1977.

1455 THE PATHOGENESIS OF URTICARIA ASSOCIATED WITH ACUTE VIRAL HEPATITIS TYPE B [Abstract]. (Eng.) Dienstag, J. L.; Rhodes, A. R.; Wands, J. R.; Bhan, A. K.; Dvorak, A. M.; Isselbacher, K. J. (Massachusetts General Hosp., Boston, MA). *Gastroenterology* 73(5):1217; 1977.

1456 NATURAL HISTORY OF HEPATITIS B SURFACE ANTIGEN (HBsAg) CHRONIC CARRIER STATE [Abstract]. (Eng.) Childress, L.; Sampliner, R. E. (Div. Gastroenterology, Univ. Maryland, Baltimore, MD). *Gastroenterology* 73(5):1216; 1977.

1457 PREVALENCE OF HEPATITIS B (HB) INFECTION AMONG HOUSEHOLD CONTACTS OF CHRONIC HEPATITIS B SURFACE ANTIGEN (HBsAg) CARRIERS [Abstract]. (Eng.) Bernier, R.; Sampliner, R. E. (Johns Hopkins Sch. Hygiene, Baltimore, MD). *Gastroenterology* 73(5):1213; 1977.

See also, 0956, 1106, 1141, 1142, 1365, 1366, 1380, 1392, 1403, 1415, 1466, 1467, 1481, 1634.

LIVER AND BILIARY TRACT

Chronic Hepatitis

1458 CLINICAL SIGNIFICANCE OF SERUM COMPLEMENT IN CHRONIC LIVER DISEASE AND ACUTE HEPATIC INSUFFICIENCY. (Ita.) Naccarato, R.; Farini, R.; Chiaramonte, M.; Meani, A.; Giordano, C.; Gritti, G. (Clinica Medica I, Universita degli Studi, Padova, Italy). *Minerva Gastroenterol.* 22(3):213-218; 1976.

Serum levels of two complement fractions, C3 and C4, were determined in a series of patients with various acute and chronic liver diseases. The C3 fraction of complement was much lower in patients with massive liver necrosis, chronic active hepatitis (CAH) with cirrhosis, cirrhosis with and without ascites, and cirrhosis after portacaval anastomosis than in normal controls. In patients with primary bilateral cirrhosis (CPB) however, C3 levels were much higher than control values. In patients with CAH without cirrhosis, C3 levels were not appreciably different from the control levels. In CAH patients, there was no correlation between C3 levels and serum levels of antibodies and immunoglobulins but there was a significant correlation between C3 levels and pseudocholinesterase levels. In patients with CPB, there was a correlation between C3 levels and alkaline phosphatase levels but not between C3 levels and bilirubinemia. There was no correlation between C3 levels and any immunological indicators. C4 levels paralleled C3 levels in all patients. There was no evidence that complement was used in the formation of immunological components in the blood. It is concluded that C3 and C4 levels cannot be used to follow the immune response in CAH patients and that the significance of C3 and C4 levels in CPB patients cannot be determined from these studies.

1459 EVALUATION OF CELLULAR IMMUNITY BY SKIN TEST IN CHRONIC HEPATITIS AND LIVER CIRRHOSIS. (Ita.) Savorani, G.; Sarti, G. (Ospedale Provinciale Specializzato M. Malpighi, Bologna, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(12):859-865; 1976.

Cellular immunity in terms of sensitivity to dinitrochlorobenzene (DNCB) and reaction to five intradermal skin tests were measured in 6 patients with chronic aggressive hepatitis (CAH), 9 patients with chronic persistent hepatitis (CPH), and 45 patients with cirrhosis. Twelve of the cirrhosis patients were classified as "compensated" and 33 were classified as "noncompensated." Eight of 9 CPH patients, 4 of 6 CAH patients, 8 of 12 "compensated" cirrhosis patients, and 9 of 23 "noncompensated" cirrhosis patients were DNCB-positive. Nine of 9 CPH patients, 5 of 6 CAH patients, 12 of 12 "compensated" cirrhosis patients, and 24 of 33 "noncompensated" cirrhosis patients were positive for at least one of the five intradermal tests. All 29 DNCB-positive patients were also positive for at least one intradermal test. Of the 31 DNCB-negative patients, 21 were positive for at least one intradermal test while 10 were both DNCB negative and intradermal test negative. Of these 10 patients, 8 were "noncompensated" cirrhosis patients and one was a CAH type B patient. Cellular immunity remains generally intact in CPH patients and in patients with moderate cases of CAH. Cirrhosis patients first lose the ability to respond to new antigens and then the capacity to recognize an antigen with which they have had previous contact. There appears to be a correlation between a deficiency in cellular immunity and the type and phase of liver disease. DNCB appears to be a more sensitive indicator of this deficiency than are intradermal skin tests.

1460 AUTOIMMUNITY IN CHRONIC ACTIVE HEPATITIS AND DIABETES MELLITUS. A REVIEW. (Eng.) Galbraith, R. M.; Fudenberg, H. H. (Medical Univ. South Carolina, Charleston, SC 29401). *Clin. Immunol. Immunopathol.* 8(1):116-149; 1977.

Current evidence for the occurrence of autoimmunity in chronic active hepatitis and diabetes mellitus is reviewed. In addition, factors of potential importance in the initiation and perpetuation of these potentially damaging reactions are discussed in relation to the genetics of these disorders. The development of techniques for examining cellular immunity, particularly the leukocyte migration test, made the search for evidence of organ-specific immunity in chronic active hepatitis possible. Leukocyte inhibitory factor production has been measured in most studies, but a number of different antigens have been used. The major difficulty in these studies has been in establishing vital cultures of normal adult hepatocytes, although diseased liver tissue from patients with alcoholic liver disease has been successfully established in long-term culture. Progress in the investigation of humoral immunity to lipoprotein derived from the cell membrane (LP-I) has lagged behind that of cellular responses, since the demonstration of liver-specific antibodies in the serum of patients with chronic active hepatitis is more difficult. One investigator has used a passive hemagglutination technique to detect antibodies to liver-specific protein, the antigens used being a mixture of LP-I and a smaller cytoplasmic antigen, LP-II. Human studies demonstrating evidence of organ-specific autoimmunity in chronic active hepatitis have been reinforced by a number of animal experiments. In one case, chronic hepatitis was successfully induced in rabbits by means of repeated injections of human and rabbit liver-specific protein in complete Freund's adjuvant. The accumulation of evidence of autoimmune reactions in diabetes mellitus has in many respects run parallel to that in chronic active hepatitis. Antibodies directed against crude homogenates of pancreas including exocrine tissue were first described in 1960.

1461 HLA AND CHRONIC ACTIVE HEPATITIS. (Eng.) Mazzilli, M. C.; Trabace, S.; DiRaimondo, F.; Visco, G.; Gandini, E. (Cattedra di Genetica Medica, Universita degli Studi di Roma, Ospedale L. Spallanzani, Via Portuense, 292 Roma, Italy). *Digestion* 15(4):278-285; 1977.

Histocompatibility antigen (HLA) typing (24 alleles of the A and B loci) was performed in 42 patients with chronic active hepatitis (CAH). The criteria used for diagnosis were (a) histological profile of CAH, (b) SGOT transaminase levels above 50 mU/ml, (c) serum γ-globulin above 2 g% or at least two positive immunologic tests, and (d) clinical course lasting at least 180 days or cirrhosis evident at biopsy. An increased frequency of HLA-A3 was observed (47.6% compared to 19.1%) in 266 healthy controls. The phenotype association A3/Bw35 also was increased (28.5% in the CAH groups compared to 6.0% in controls). HLA typing was performed in seven families of seven A3/Bw35 CAH patients. In five of the families, the A3/Bw35 haplotypic segregation was proven. The data in this study indicate that the HLA phenotype is a marker of a dominant susceptibility to the disease.

1462 HLA IN DIFFERENT FORMS OF CHRONIC ACTIVE HEPATITIS. A COMPARISON BETWEEN ADULT PATIENTS AND CHILDREN. (Eng.) Freudenberg, J.; Baumann, H.; Arnold, W.; Berger, J.; Meyer zum Buschenfelde, K. H. (Blutspendedienst des DRK-Landesverbandes Rheinland-Pfalz Burgweg 5-7, D-6550 Bad Kreuznach, Mainz, W. Germany). *Digestion* 15(4): 260-270; 1977.

The presence or absence of hepatitis B surface antigen (HBsAg) and autoantibodies (AutoAb) were measured and correlated with histocompatibility antigens (HLA) in 108 adult patients and 34 children with chronic active hepatitis (CAH). All patients had the morphological profile typical of CAH and clinical and biochemical signs of high inflammatory activity of at least 6-months duration. Patients were divided into four groups: (1) AutoAb-positive and HBsAg-negative (probably causing an autoimmune type of CAH), (2) AutoAb-negative and HBsAg-negative (pathogenic mechanism unknown but may be a nonhepatitis B virus), (3) HBsAg-positive and AutoAb-negative, and (4) HBsAg-positive and AutoAb-positive (most likely caused by hepatitis B virus). The distribution of HLA among the four groups showed no statistically significant differences. When HLA levels in these groups were compared with controls, an increased frequency of HLA-B8 and HLA-A_1 was noted in the autoimmune type of CAH (group 1). The relative risk for HLA-B8-positive adults to get an autoimmune hepatitis is 19.6, compared to 7.0 in children, and 15.4 in combined groups. No other significant deviation of HLA antigens for the different types of CAH was observed.

1463 CHANGES IN LABORATORY PARAMETERS IN LIVER DISEASE PATIENTS AFTER TREATMENT WITH TOXEPASE COMPLEX. (Ita.) Lenzi, S. (I Istituto di Patologia Speciale Medica e Metodologia Clinica, Universita di Bologna, Bologna, Italy). *Minerva Med.* 67(46):2961-2974; 1976.

Twenty patients with liver disease (9 with chronic aggressive hepatitis [CAH], 2 with chronic persisting hepatitis [CPH], and 9 with cirrhosis) were treated with Toxepase complex, which consists of uridine-5-diphosphoglucose, glutathione, and vitamin B_{12}. Treatment was evaluated by determining LDH, glutamic acid dehydrogenase, alkaline phosphatase, γ-glutamyl transpeptidase, and nonspecific cholinesterase activities. These enzyme activities can indicate cellular necrosis, cholestasis, and impaired protein synthesis. Two weeks after the initiation of treatment, the serum levels of these enzymes decreased, indicating a return to normal liver function in the patients. This return to normal levels occurred in all patients and was most apparent in those with CAH and cirrhosis. CPH patients benefited least from treatment. Toxepase complex appears to be useful in the treatment of CAH and liver cirrhosis.

1464 NEW CONCEPTS ON THE PATHOGENESIS OF THE HEPATORENAL SYNDROME [Abstract]. (Eng.)

Gentilini, P.; Laffi, G.; Buzzelli, G.; Cappelli, G.; Stefani, P.; Paladini, S.; Arcangeli, A. (III Dept. Medical Pathology, Univ. Florence, Florence, Italy). *Gastroenterology* 73(5):1221; 1977.

1465 STEROID TREATMENT OF HBsAg-POSITIVE SEVERE CHRONIC ACTIVE LIVER DISEASE (CALD): DETERMINANTS OF EARLY PROGNOSIS [Abstract]. (Eng.) Czaja, A. J.; Wolf, A. M. (Mayo Clinic, Rochester, MN). *Gastroenterology* 73(5):1217; 1977.

1466 CHRONIC ACTIVE HEPATITIS IN A CHILD WITH HEMOPHILIA A [Letter to Editor]. (Eng.) Reaman, G.; Stachewitsch, A.; Mishkin, S. (Montreal Children's Hosp., Montreal, Quebec, Canada). *Can. Med. Assoc. J.* 117(7):731-732; 1977.

1467 CLINICAL SIGNIFICANCE OF THE ORCEIN STAIN [Abstract]. (Eng.) Whitcombe, F. F., Jr.; Haggitt, R. C.; Tornay, A. S., Jr.; Kutteruf, G. C. (Lahey Clinic Foundation, Boston, MA). *Gastroenterology* 73(5):1254; 1977.

1468 Clq BINDING ACTIVITY AND COMPLEMENT (Clq, C3) CATABOLISM IN PRIMARY BILIARY CIRRHOSIS AND CHRONIC ACTIVE LIVER DISEASE [Abstract]. (Eng.) Thomas, H. C.; Potter, B. J.; Elias, E.; De Villiers, D.; Sherlock, S. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Gastroenterology* 73(5):1250; 1977.

1469 LEVAMISOLE IN THE TREATMENT OF HBs ANTIGEN POSITIVE CHRONIC ACTIVE LIVER DISEASE [Abstract]. (Eng.) Thomas, H. C.; Chadwick, G.; Jain, S.; Sherlock, S. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Gastroenterology* 73(5):1250; 1977.

1470 SIGNIFICANCE OF ISOENZYMES IN THE DIFFERENTIAL DIAGNOSIS OF ACUTE AND CHRONIC HEPATITIS. (Ger.) Graubaum, H. J.; Schimmelpfennig, W.; Schneider, G.; Klimmt, G.; Wagenknecht, C. (Hessische Strasse 3/4, DDR-104 Berlin, E. Germany). *Z. Gesamte Inn. Med.* 32(3):40-42; 1977.

See also, 1260, 1367, 1378, 1401, 1403, 1421, 1422, 1424, 1425, 1427, 1428, 1432, 1442, 1444, 1457, 1482, 1486, 1487, 1492.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

1471 IDIOPATHIC HEMOCHROMATOSIS AND IRON OVERLOAD IN ALCOHOLIC LIVER DISEASE: DIFFERENTIATION BY HLA PHENOTYPE. (Eng.) Simon, M.; Bourel, M.; Genetet, B.; Fauchet, R.; Edan, G.; Brissot, P. (Hopital Pontchaillou, 35043 Rennes, France). *Gastroenterology* 73(4):655-658; 1977.

Histocompatibility antigens (HLA) A and B were determined in 38 patients with idiopathic hemochromatosis (IH) and 22 patients with iron overload accompanying alcoholic liver disease (AH). As previously described, HLA A3 and HLA B14 antigens appeared more frequently in the IH group (76.3% and 28.9%, resp.) than in 204 controls (27% and 3.4%). In the AH group, the frequency of A3 (22.7%) and B14 (13.6%) was not significantly different from that observed in controls. The frequency of A3 was significantly lower in the AH group than in the IH group ($p<0.0001$). On this basis, a clear difference appears between the two conditions with iron overload, and genetic analysis of the results ruled out the hypothesis that AH would be a heterozygous form of IH exposed by alcohol.

1472 EARLY PERIVENULAR SCLEROSIS IN ALCOHOLIC FATTY LIVER: AN INDEX OF PROGRESSIVE LIVER INJURY. (Eng.) Van Waes, L.; Lieber, C. S. (Bronx Veterans Admin. Hosp., 130 West Kingsbridge Rd., Bronx, NY 10468). *Gastroenterology* 73(4):646-650; 1977.

To determine whether perivenular sclerosis, found in heavy drinkers with fatty liver, could be a precursor lesion of cirrhosis, controlled studies were performed in animal models and in humans. In alcohol-fed baboons that developed fibrosis or cirrhosis, progressive perivenular sclerosis invariably started at the fatty liver stage before or, even more commonly, in the absence of alcoholic hepatitis. No sclerosis occurred in controls or in alcohol-fed baboons and rats that did not progress beyond the fatty liver stage. Thirty of 75 patients who were heavy drinkers and had fatty liver (without other alcohol-induced liver changes) had a rim of fibrous tissue around the terminal hepatic venules that stained for collagen. None of 20 age-matched, nonalcoholic controls had sclerosis. In five controls who consumed moderate amounts of alcohol (36-43% of total caloric intake) for up to 4 weeks, fatty liver developed, but perivenular sclerosis did not. The clinical and experimental data indicate that sclerosis around the terminal venules, a common but often overlooked complication of alcoholic fatty liver, reflects heavy prolonged drinking, and may identify those patients who are susceptible to develop the more advanced lesions of alcoholic liver injury upon continued drinking.

1473 TESTICULAR AND SPERMATOZOAL AUTOANTIBODY IN CHRONIC ALCOHOLIC MALES WITH GONADAL FAILURE. (Eng.) Van Thiel, D. H.; Gavaler, J. S.; Smith, W. I.; Rabin, B. S. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Clin. Immunol. Immunopathol.* 8(2):311-317; 1977.

To determine whether immunity plays a part in the development or perpetuation of alcoholic gonadal injury, sera from 40 chronic alcoholic men, whose liver histology was classified by biopsy, were examined for the presence of autoantibodies utilizing a panel of tissue antigens. The frequency of autoantibodies detected in the alcoholic men was compared with that observed in 450 control men. Antibody only to spermatozoa and testicular antigens was detected in the alcoholic men at an increased frequency ($p \leq 0.001$). The reproductive function of the testes was evaluated in the alcoholic men. Of 22 alcoholic men requested to collect an ejaculate for evaluation, only 5 were potent enough to obtain a specimen for analysis. Two of these five alcoholic men were azoospermic and one was consistently oligospermic. All nine alcoholic men subjected to testicular biopsy demonstrated seminiferous tubular atrophy. Autoimmunity may play a role in the development or perpetuation of the observed gonadal failure present in alcoholic men.

1474 LIPOLYSOSOMES IN HUMAN LIVER: DISTRIBUTION IN LIVERS WITH FATTY INFILTRATION. (Eng.) Hayashi, H.; Winship, D. H.; Sternlieb, I. (Univ. Missouri Medical Center, Columbia, MO 65201). *Gastroenterology* 73(4):651-654; 1977.

The hepatocytes of 14 randomly selected patients with liver diseases were examined for the presence of lipolysosomes (lysosomes containing large lipid droplets). Organelles that displayed the same morphological characteristics and enzymatic activity as those originally described in the hamster and those found in the hepatocytes of patients with Wolman's or Wilson's disease were also found in hepatocytes of 13 of the 14 biopsy specimens that showed minimal to severe fatty infiltration. The numbers and sizes of the lipolysosomes seemed to increase with the degree of fatty infiltration, while their proportion in relation to the total number of lipid droplets remained below 5%. Lysosomes probably play an important role in hepatic lipid metabolism, and various pathogenetic mechanisms may trigger their proliferation.

1475 SERUM 25-HYDROXYVITAMIN D_3 LEVELS IN PATIENTS WITH LIVER DISEASE. (Eng.) Sonnenberg, A.; von Lilienfeld-Toal, H.; Sonnenberg, G. E.; Rohner, H. G.; Strohmeyer, G. (Stadtspital Triemli, Birmensdorferstr. 497, CH-8063 Zurich, Switzerland). *Acta Hepatogastroenterol.* 24(4): 256-258; 1977.

Serum 25-hydroxyvitamin D_3 levels were determined in 45 patients with chronic liver diseases by a radioreceptor assay and correlated with the serum albumin, calcium, and inorganic phosphate levels. The serum calcium level in the patients (4.4 ± 0.4 mEq/l) was significantly lower than that in 50 healthy controls (4.8 ± 0.2 mEq/l, $p<0.001$). The inorganic phosphate level in the patients (1.6 ± 0.3 mEq/l) was significantly lower than that in the controls (2.2 ± 0.4 mEq/l, $p<0.001$), but there was no significant correlation between the calcium level and the albumin or transaminase levels. The results indicate that 25-hydroxylation occurs mainly in the liver and that vitamin D absorption is impaired following liver injury.

1476 HEPATIC XENON-133 RETENTION: A NON-INVASIVE DIAGNOSTIC TEST FOR STEATOSIS [Abstract]. (Eng.) Ahmad, M. L.; Perrillo, R. P.; Sunwoo, Y. L.; Donati, R. M. (St. Louis Veterans Admin. Hosp., St. Louis, MO). *Gastroenterology* 73(5):1211; 1977.

1477 ENDOTOXIN AND BACTERIA IN PORTAL BLOOD [Letter to Editor]. (Eng.) Ansell, J.; Widrich, W.; Johnson, W.; Fine, J. (Veterans Admin. Hosp., Boston, MA 02130). *Gastroenterology* 73(5): 1190; 1977.

1478 THE COMPARATIVE SURVIVALS OF ALCOHOLICS VERSUS NONALCOHOLICS AFTER DISTAL SPLENORENAL SHUNT [Abstract]. (Eng.) Levi, J. U.; Zeppa, R.; Hutson, D. G.; Schiff, E.; Livingstone, A.; Fink, P. (Univ. Miami Sch. Medicine, Miami, FL 33152). *Gastroenterology* 73(5):1231; 1977.

1479 SERUM TRIIODOTHYRONINE (T_3) AS AN INDEX OF SEVERITY AND PROGNOSIS IN ALCOHOLIC LIVER DISEASE (ALD). EFFECT OF PROPYLTHIOURACIL (PTU) [Abstract]. (Eng.) Kalant, H.; Orrego, H.; Israel, Y.; Walfish, P. G.; Rankin, J.; Findlay, J. (Addiction Res. Foundation of Ontario, Toronto, Ontario, Canada). *Gastroenterology* 73(5):1227; 1977.

1480 AUTOIMMUNITY IN ALCOHOLIC HEPATITIS [Abstract]. (Eng.) Kanagasundaram, N.; Chen, T.; Leevy, C. M. (New Jersey Medical Sch., Newark, NJ). *Gastroenterology* 73(5):1227; 1977.

1481 LORAZEPAM ELIMINATION IN LIVER DISEASE [Abstract]. (Eng.) Kraus, J. W.; Marshall, J. P.; Johnson, R.; Wilkinson, G. R.;

Schenker, S. (Vanderbilt Univ. Sch. Medicine, Nashville, TN). *Gastroenterology* 73(5):1228; 1977.

1482 ELEVATION OF PLASMA ARGININE VASOPRESSIN LEVELS IN LIVER DISEASE [Abstract]. (Eng.) Hepner, G. W.; Weitzman, R. E. (Harbor General Hosp., Torrance, CA). *Gastroenterology* 73(5):1224; 1977.

1483 COMPARISON OF FEATURES OF ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Connell, A. M.; Weir, D.; Fitzgerald, O.; McDonald, W.; Whelton, M.; McCarthy, C. M.; *et al.* (Univ. Hosp., Cincinnati, OH). *Gastroenterology* 73(5):1216; 1977.

1484 FREE WATER CLEARANCE (CH_2O) AND SODIUM BALANCE (SB) BEFORE AND AFTER PERITONEOJUGULAR (PJS) AND SIDE-TO-SIDE PORTACAVAL SHUNTS (SSPS) [Abstract]. (Eng.) Capone, R. R.; Sarfeh, I. J.; Wong, P. Y. (Albany Medical Coll., Albany, NY 12208). *Gastroenterology* 73(5):1215; 1977.

1485 HIGH-DOSE SPIRONOLACTONE AS THE SOLE DIURETIC IN PATIENTS WITH REFRACTORY ASCITES [Abstract]. (Eng.) Campra, J.; Reynolds, T. B. (Univ. Southern California Sch. Medicine, Los Angeles, CA). *Gastroenterology* 73(5):1215; 1977.

See also, 0958, 1106, 1112, 1365, 1421, 1491, 1492, 1500, 1674.

LIVER AND BILIARY TRACT

Cirrhosis

1486 THE LAPAROSCOPIC STAGING OF PRIMARY BILIARY CIRRHOSIS. (Eng.) Lindner, H.; Dammermann, R.; Kloppel, G. (German Red Cross Hosp., Hamburg, W. Germany). *Endoscopy* 9(2):68-73; 1977.

The laparoscopic photographs of 38 cases of primary biliary cirrhosis with high mitochondrial antibody titers were reviewed to see if these photographs could be used as the basis of a system of laparoscopic staging. By scrutinizing the photographs taken with the Lumina photolaparoscope and reviewing the histological findings, the liver disease was divided into four stages: stage 1, nonspecific reactive hepatitis and yellowish-red coloration of the liver; stage 2, accentuation of yellowish-red pattern, increased signs of mesenchymal activity with conspicuous arterial vascularization and lymphatics, and granulomas and splenomegaly; stage 3, liver surface assumes a granular appearance with accentuation of the hexagonal lobule structure, but lobular regeneration is absent (the first signs of portal hypertension are recognizable); stage 4, development of nodularity on the liver surface and of a deepening greenish-blue color in advanced cases. Portal hypertension and decompensation are obvious features of this disease. However, by laparoscopy alone it is not possible to distinguish pure primary biliary cirrhosis from its mixed forms with chronic active hepatitis. It is suggested that intravital macropathology as revealed by the laparoscope is a valuable supplement to liver biopsy in the diagnosis and staging of primary biliary cirrhosis.

1487 EPIDEMIOLOGY OF CHRONIC LIVER DISEASES. (Eng.) Jorke, D.; Reinhardt, M. (Stadtisches Krankenhaus Jena, Dornburger Str. 159, DDR-69 Jena, E. Germany). *Acta Hepatogastroenterol.* 24(4):220-225; 1977.

The frequency and distribution of chronic liver diseases were studied in the East German population. In East Germany, mortality from liver cirrhosis decreases, in contrast to most other countries, although alcohol consumption is continuously increasing. In Berlin and in the industrialized districts, mortality from cirrhosis is higher than in the rural areas. Within a period of 6 yr, the number of inpatients with chronic liver diseases has risen from 11,600 to 14,200. From the epidemiologic point of view, viral hepatitis is not the main source of liver cirrhosis. The total recovery rate for acute hepatitis has increased from 80% to 94% over a period of 8 to 10 yr; liver cirrhosis was found to have developed only in 0.3%. Seventy percent of cirrhotic patients never suffer from viral hepatitis. Seventy-three percent of 1.8 million blood donors that were subjected to SGPT and hepatitis B surface antigen screening tests showed histologic changes of the liver. Using these screening methods it has been possible to register 7% of the persons among these blood donors as having liver diseases. Early recognition and treatment of chronic liver diseases seem to result in a reduction of mortality from liver cirrhosis.

1488 TOTAL FATTY ACIDS OF HUMAN LIVER IN RELATION TO AGE, SEX AND PATHOLOGY. (Eng.) Gershbein, L. L.; Baburao, K.; Pedroso, A. F. (Northwest Inst. Medical Res., 5656 W. Addison St., Chicago, IL 60634). *Acta Hepatogastroenterol.* 24(4):250-255; 1977.

Fatty acid composition was determined in lipids extracted from 28 normal, 3 fatty, and 2 cirrhotic adult livers removed at necropsy as well as from 4 newborn and infant organs. The total fatty acids were processed, the methyl esters submitted to gas chromatographic analysis, and the acid differences ascertained relative to age, sex, and pathology. The levels of unsaturated acids ranged higher than those of the saturated homologs and were even greater in the fatty liver lipids. The latter showed an increase in 18:1 and depressions in 18:0, 22:0, and 24:0 as compared with the normal specimens and the same changes in 18:0 and 18:1 as compared with the cirrhotic lipids.

1489 STUDY OF HEPATIC PORPHYRINS IN PATIENTS WITH LIVER CIRRHOSIS.

(Spa.) Enriquez De Salamanca, R.; Solis Herruzo, J. A.; Arnalich, F.; Pardo Rueda, J. (Instituto de Medicina Experimental del C.S.I.C., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(6):805-808; 1976.

Among 2,286 liver biopsy samples observed under UV light, 52 showed the red fluorescence (F+) characteristic of porphyria cutanea tarda (PCT), yet only 38/52 patients had dermal lesions and clinical symptoms of PCT. The remaining 14 F+ patients had chronic hepatopathies. Levels of the hepatic porphyrins (uro-, hepta-, hexa-, penta-, copro-, and protoporphyrin) in liver samples from seven F+ PCT patients and ten F+ hepatopathy patients were assessed by electrophoresis. Results were compared with those obtained in 20 patients with normal livers, 15 cirrhotic patients (F-), 6 patients with hepatic tumors, and 6 with cholestasis due to biliary obstruction. Total porphyrin levels were higher in the tissues of all 17 F+ patients than in normal tissues: 387 ± 119 µg/100 g for F+ patients without PCT, 5,935 ± 3,748 µg/100 g for F+ PCT patients versus 84 ± 31 µg/100 g for patients with normal livers. Total porphyrin levels were 140 ± 54 µg/100 g in F-cirrhosis patients, 372 ± 85 µg/100 g in patients with primary liver tumors, and 247 ± 73 µg/100 g in cholestasis patients. There was a higher proportion of uro- and heptaporphyrin in PCT liver tissue than in F+ non-PCT tissue. In the tumor tissue and cirrhosis F- and cholestasis tissues, protoporphyrin, and coproporphyrin predominated. The proportion of the different porphyrins was similar in all F- tissues to the proportion of porphyrin in normal tissue, whereas the proportions in both F+ groups were different from that in normal tissue. The similarities among the accumulated porphyrins in PCT patients and F+ chronic hepatopathy patients suggest that the same metabolic error may play a role in both disorders.

1490 ELECTROPHORETIC ANALYSIS OF URINARY PORPHYRINS IN HEPATIC CIRRHOSIS.

(Spa.) Solis Herruzo, J. A.; Enriquez de Salamanca, R.; Pardo Rueda, J.; Arnalich, F. (Instituto de Medicina Experimental del C.S.I.C., Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 47(6):813-816; 1976.

The urine of 25 cirrhotic patients was analyzed to determine the incidence of porphyria cutanea tarda (PCT) in patients without the dermatological symptoms of this disease and the results were compared with those from 50 patients with PCT and 30 normal controls. Seventeen of the 25 cirrhotic patients had a marked history of alcoholism, 2 were Australia antigen positive, and 6 others were lacking these etiological factors. The uro-, hepta-, hexa-, penta-, and coproporphyrin fractions in the urine were separated by electrophoresis. A Doss index of PCT >14/100 indicated a carrier of the metabolic error of PCT. Eight of the cirrhotic patients had a pathologic PCT index. Such an anomaly in the electrophoretic pattern of the urinary porphyrins was confirmed by fluorescence tests; hepatic tissue gave a red fluorescence and had elevated levels of uro- and heptaporphyrins (54.5 ± 18.9 µg/day and 18 ± 10 µg/day, resp., versus 9 ± 7 µg/day and trace amounts, resp., in normal controls). No correlation was evident between the degree of the hepatopathy and the urinary pattern of the porphyrins. The metabolism of the porphyrins may be genetically altered in many of the patients, and this alteration may manifest itself in many ways, one of which is hepatopathy.

1491 THE CONVERSION OF D-XYLOSE INTO D-THREITOL IN PATIENTS WITHOUT LIVER DISEASE AND IN PATIENTS WITH PORTAL LIVER CIRRHOSIS.

(Eng.) Pitkanen, E. (Univ. Central Hosp., Unioninkatu 38, SF-00170 Helsinki 17, Finland). *Clin. Chim. Acta* 80(1):49-54; 1977.

The extent of D-threitol formation in the oral D-xylose tolerance test and the role of the liver in D-xylose metabolism were studied. An oral D-xylose tolerance test was carried out in 12 patients with portal liver cirrhosis, in 7 patients with active fatty liver disease, and in 29 subjects without liver diseases. D-xylose and D-threitol were measured by means of gas-liquid chromatography. Fifteen percent of the D-xylose dose excreted in urine within 5 hr was recovered as D-threitol. The proportion of D-threitol was greater when the collection was extended to 24 hr. The D-threitol excretion was markedly diminished in cirrhotic patients, suggesting that a substantial proportion of the D-xylose-D-threitol conversion occurs in the liver. No decrease was detected in patients with fatty liver disease. No significant change in D-xylose excretion was observed in liver cirrhosis or in fatty liver disease. D-threitol can be regarded as the main end product of D-xylose metabolism in man.

1492 DEMONSTRATION OF ANTIBODIES AGAINST ALBUMINS IN CHRONIC HEPATOPATHIES: THEIR RELATION TO ALBUMIN TURBIDITY AND SOME OTHER TESTS.

(Cze.) Fassati, P.; Jezkova, Z.; Spizek, J. (Oddeleni klinicke biochemie, OUNZ, Sokolovska 304, 190 00 Prague 9, Czechoslovakia). *Cas. Lek. Cesk.* 116(19):584-587; 1977.

Antibodies against albumins and their relation with albumin turbidity and other tests were studied in 50 patients with chronic hepatopathies (33 patients with liver cirrhosis or chronic hepatitis with clinical signs of developing cirrhosis [group 1], and 17 patients with hepatic steatosis [group 2]). Antibodies to albumins were found in 15 patients in group 1 (in 8/19 patients with medium degree of hepatic dysfunction and in 7/14 patients with severe dysfunction) and in 2 patients in group 2. Statistically significant positive correlation was found between the frequency of anti-albumin antibodies and the Takata reaction (correlation factor 0.402), the thymol turbidity test (correlation factor 0.411), and the gamma-globulin electrophoresis test (correlation factor 0.352) in group 1. The correlations between the anti-albumin antibodies and the albumin turbidity test and albumin and globulin electrophoresis tests were at the limit of statistical significance. The SGOT level correlated with the anti-albumin antibodies at the limit of statistical significance in group 2, but there were no other correlations.

1493 IMMUNE RESPONSE TO ϕX 174 IN MAN. 5. PRIMARY AND SECONDARY ANTIBODY PRODUCTION IN PRIMARY BILIARY CIRRHOSIS.

(Eng.) Thomas, H. C.; Holden, R.; Jones, J. V.; Peacock, D. B. (Western Infirmary, Glasgow, Scotland). *Gut* 17(11):844-848; 1976.

To study changes in the immune response induced by primary biliary cirrhosis (PBC), 12 patients with this disease were subjected to i.v. antigenic challenge with the bacteriophage ϕX 174, and the IgM and IgG components of the primary and secondary immune responses were measured. The patients were challenged with ϕX 174 (2.0×10^9 plaque-forming U) on day 0 and again between the 28th and 42nd day after the first challenge. The primary immune response to ϕX 174 in the PBC patients was within the normal range, the peak mean titer being 760 ± 308. However, the secondary response was significantly decreased ($p<0.01$). There was no correlation between the degree of depression of the peak response and the severity of the disease, as shown by the degree of cholestasis or hepatocellular necrosis. All patients showed a marked increase in the total serum IgM concentration, and a moderate increase in IgG. The ratio of serum IgM to IgG was above normal in all cases. During the secondary response there was a higher proportion of IgM antibody than in normal subjects. Sheep RBC (E) rosette forming cells were reduced in concentration in the PBC patients, but there was no correlation with either the clinical or histological grading of the disease. There was a positive correlation between the primary and secondary antibody titers and the thymus-derived (T) cell concentration in the peripheral blood ($r=0.73$, p 0.01; $r=0.84$, $p<0.001$). EAC rosette-forming cells were reduced in some patients, and there was a positive correlation between the concentration of these cells and the magnitude of both the primary ($r=0.66$, $p<0.05$) and secondary response ($r=0.89$, $p<0.001$). There was a poor correlation between phytohemagglutinin responsiveness and E rosetting cell concentrations. Depressed T cell function in PBC may be partially responsible for the proportionately lower IgG compared with IgM antibody response.

1494 HYPOXIA AND HYDROTHORACES IN A CASE OF LIVER CIRRHOSIS: CORRELATION OF PHYSIOLOGICAL, RADIOGRAPHIC, SCINTIGRAPHIC, AND PATHOLOGICAL FINDINGS.

(Eng.) Stanley, N. N.; Williams, A. J.; Dewar, C. A.; Blendis, L. M.; Reid, L. (Middlesex Hosp., Mortimer St., London W1N 8AA, England) *Thorax* 32(4):457-471; 1977.

The case of a 45-yr-old woman with liver cirrhosis complicated by cyanosis and recurrent right hydrothorax is described. A diagnostic pneumoperitoneum demonstrated that direct movement of ascites through a diaphragmatic defect was responsible for the hydrothoraces. Pulmonary function tests between episodes of hydrothorax showed severe arterial hypoxemia, a 23% right-to-left shunt, and a reduction in the carbon monoxide transfer factor to less than half the predicted value. Evidence of abnormal intrapulmonary arteriovenous communications was obtained by perfusion scanning. At necropsy the central tendon of the diaphragm showed numerous areas of thinning that were easily ruptured. Injection of the pulmonary arterial tree demonstrated precapillary arteriovenous anastomoses and pleural spider nevi. Morphometry provided quantitative evidence of pulmonary vasodilatation limited to the intra-acinar arteries, consistent with the effect of a circulating vasodilator. The scintigraphic and pathological findings suggested that shunting had been greater in the right than the left lung. Light microscopy of thin lung sections showed that the walls of small veins were thickened, and electron microscopy showed that this was due to a layer of collagen. The walls of capillaries were similarly thickened, which caused an approximately twofold increase in the minimum blood-gas distance and contributed to the reduction in transfer factor.

1495 EXERCISE-AGGRAVATED HYPOXEMIA AND ORTHODEOXIA IN CIRRHOSIS.

(Eng.) Kennedy, T. C.; Knudson, R. J. (Univ. Arizona Coll. Medicine, Tucson, AZ 85724). *Chest* 72(3):305-309; 1977.

The case of a patient with a syndrome characterized by hypoxemia aggravated by exercise, orthodeoxia, hypocapnia, and evidence of hyperdynamic circulatio complicating alcoholic cirrhosis is presented. The patient, a 63-yr-old man, first presented with dyspnea on exertion 4 yr after he had undergone a side-to-side portacaval anastomosis for bleeding esophageal varices. In addition to his other symptoms, there was hazy nodularity on chest x-ray films, clubbing, and reduced carbon monoxide diffusing capacity, but he had otherwise normal indices of pulmonary air flow, volume, and distribution of ventilation. The hypoxemia was more pronounced with the patient in the upright position an was further aggravated by exercise. This supports the presence of a shunt or shunt-like mechanism consisting of low-resistance vascular communication within the lung.

1496 TREATMENT OF REFRACTORY ASCITES BY REINFUSION OF THE ASCITIC FLUID.

(Ita.) Sturniolo, G. C.; Farini, R.; Martin, A.; Chiaramonte, M.; D'Angelo, A.; Ossi, E.; *et al.* (Cattedra Malattie Apparato Digerente, Istituto di Clinica medica I, Universita, Padova, Italy). *Recent. Prog. Med. (Roma)* 62(1):51-57; 1977.

Twenty-nine patients who developed ascites as a complication of cirrhosis were treated by reinfusion of concentrated ascitic fluid. Ascitic fluid was withdrawn from the abdominal cavity during peritoneal dialysis, concentrated by ultrafiltration, and reintroduced into the circulation through a vein in the arm. In the hour preceding introduction of the concentrated fluid, 1,000 ml of the unconcentrated ascitic fluid was recirculated through the body by a Watson Marlowe pump. Two hours after introduction of the concentrated fluid, patients were given 20-100 mg of furosemide i.v. Six hr after treatment began they were given a 3% solution of NaCl i.v. to compensate for the loss of electrolytes by ultrafiltration. Daily diuresis during the 5-day period preceding treatment and the 5-day period immediately after treatment showed a statistically significant increase of from 1.02 l to 1.5 l. There was no significant variation in azotemia, creatinemia, sodium or potassium levels, bilirubinemia or transaminase levels, and protein albumin or gamma globulin either before or after treatment. No major complications developed, although 48.8% of patients developed fever (not above 39 C), 53.3% developed chills, and 51% developed tachycardia (did not exceed 110 beats/min). Clinical improvement was observed for 2-27 months after treatment in 44% of the cases. Reinfusion of ascitic fluid is used for treatment of refractory cases and the majority of treated patients are in the final phases of the disease. It is difficult, therefore, to determine whether this treatment is effective solely in relieving symptoms or if it affects the ultimate course of the disease process.

1497 EFFECT OF β ADRENERGIC BLOCKING DRUGS IN THE RENIN-ALDOSTERONE SYSTEM, SODIUM EXCRETION, AND RENAL HEMODYNAMICS IN CIRRHOSIS WITH ASCITES. (Eng.) Wilkinson, S. P.; Bernardi, M.; Smith, I. K.; Jowett, T. P.; Slater, J. D. H.; Williams, R. (King's Coll. Hosp., Denmark Hill, London, SE5, England). *Gastroenterology* 73(4): 659-663; 1977.

The effects of propranolol and practolol on plasma renin activity were studied in 11 patients with cirrhosis and ascites. Their effects on the associated changes in aldosterone excretion, sodium excretion, and the intrarenal distribution of plasma flow were also investigated. As a result of effective β adrenergic blockade with either propranolol or practolol, plasma renin activity was suppressed in all 11 patients. In contrast, the effect on the rate of renal excretion of aldosterone was variable, suggesting that factors other than the renin-angiotensin system control the aldosterone secretion in cirrhosis. The changes in aldosterone could not be explained on the basis of changes in the plasma concentrations of potassium or sodium. The renal sodium excretion was inversely related to the values for aldosterone both before and after β adrenergic blockade, indicating a major role for aldosterone in regulating sodium excretion. A number of patients had an abnormal intrarenal distribution of plasma flow with a relative hypoperfusion of the renin-secreting outer cortical nephrons. Plasma renin activity was inversely related to outer cortical plasma flow, suggesting that the reduced outer cortical flow may be a stimulus to increased renin secretion. Because the abnormal intrarenal hemodynamic pattern was not corrected by suppression of plasma renin activity, and presumably angiotension II concentrations, it is unlikely that it is attributable to the known renal vasoconstrictor effects of angiotensin II.

1498 GROWTH HORMONE SECRETION AFTER L-DOPA TREATMENT OF LIVER CIRRHOSIS. (Ita.) Greco, A. V.; Ghirlanda, G.; Fedeli, G.; Rebuzzi, A.; Altomonte, L.; Manna, R. (Istituto di Patologia Medica, Universita Cattolica S. Cuore-Roma, Rome, Italy). *Minerva Med.* 67(47):3027-3032; 1976.

L-dopa (500 mg p.o.) was administered to 14 men with alcoholic cirrhosis of the liver and to 10 normal control subjects. L-dopa had no significant effect on plasma glucose or insulin levels in either the patients or controls. However, plasma levels of growth hormone (GH) were elevated in both groups. Ninety minutes after treatment, GH levels had risen from 1.97 ng/ml to 17.34 ng/ml in the controls and from 5.56 ng/ml to 28.03 ng/ml in the cirrhotics. These levels were significantly higher in the patients than in the controls. Three hours after treatment, GH levels returned to baseline values in both groups. This outcome was probably a reflection of the actual secretion of the hormone rather than its metabolism by the liver, since its rate of appearance and disappearance in the blood was the same in both the cirrhotics and controls.

1499 SURGICAL TREATMENT OF PORTAL HYPERTENSION BY MEANS OF SELECTIVE VASCULAR DERIVATIONS. (Spa.) Orozco, H.; Guevara, L.; Hernandez-Ortiz, J.; Elizondo, J.; Nieto, L.; Campuzano, M. (Natl. Inst. Nutrition, San Fernando Ave. and Tlalpan Viaduct, Mexico 22, D.F.). *Rev. Invest. Clin.* 29(2): 143-150; 1977.

Forty patients with portal hypertension were treated with selective venous shunts. Twenty patients had alcoholic cirrhosis, 16 had infectious cirrhosis, 1 had cirrhosis of unknown origin, and 3 had portal fibrosis. The 36 patients selected for the study who had elective operations were in a good state of general health otherwise, whereas the 4 patients who underwent emergency operation had profuse digestive hemorrhages and required immediate surgery. The surviving patients have been checked regularly every 3 months since the time of surgery. A selective end-to-end renosplenic shunt was performed in 24 patients (21 elective and 3 emergency operations); 9 patients had an elective distal splenorenal shunt (Warren), and 7 patients were treated by a selective end-to-side splenocaval shunt (4 elective without graft and 2 elective and 1 emergency with

Dacron grafts). Patient deaths within a month after surgery were considered as due to operative mortality. Mortality among the 36 patients who underwent elective surgery was 22%, and among the 4 who underwent emergency surgery it was 50%. Operative mortality for elective distal splenorenal shunt, selective end-to-end renosplenic shunt (elective), selective end-to-end renosplenic shunt (emergency), and selective end-to-side splenocaval shunt (elective) was 11.1%, 23%, 33%, and 33%, resp. The one patient who had emergency selective end-to-side splenocaval shunt died, bringing the total number of deaths to 10. Causes of death included infected ascites (1), liver failure (4), massive necrosis of the liver with reversal of portal venous blood flow (3), acute renal failure and hepatic failure (1), and acute cardiac, respiratory, and renal failure (1). Most frequent postoperative complications were upper gastrointestinal tract bleeding (7), hepatic insufficiency (24), and ascites (33). One patient had hepatic encephalopathy 2 yr after surgery. Survivors have no dietary restrictions, except for alcoholic beverages, and live normally.

1500 SURVIVAL IN PATIENTS WITH POSTNECROTIC CIRRHOSIS AND LAENNEC'S CIRRHOSIS UNDERGOING THERAPEUTIC PORTACAVAL SHUNT. (Eng.) Kanel, G. C.; Kaplan, M. M.; Zawacki, J. K.; Callow, A. D. (Univ. Chicago Hosp., 950 E. 59th St., Chicago, IL 60637). *Gastroenterology* 73(4, Part 1):679-683; 1977.

Survival rates were compared in 82 patients who underwent therapeutic portacaval shunt for Laennec's cirrhosis (45 cases), postnecrotic cirrhosis (29), or primary biliary cirrhosis (8). All patients were followed for at least 5 yr after shunt or until death. Survival rates were calculated by life-table methods. Eleven patients with postnecrotic cirrhosis had histological evidence of chronic active hepatitis. Survival rates were similar in alcoholic cirrhosis, postnecrotic cirrhosis, and primary biliary cirrhosis. Hepatic reserve provided the best criterion for predicting survival. The type of shunt, end-to-side, side-to-side, or splenorenal, did not influence survival. Histological evidence of chronic active hepatitis adversely affected survival in the patients with postnecrotic cirrhosis. However, histological evidence of ongoing alcoholic hepatitis in patients with Laennec's cirrhosis did not influence survival adversely. These data indicate that once a patient with cirrhosis has bled from esophageal varices, the etiology of the cirrhosis is not a major factor in determining survival after a therapeutic portacaval shunt.

1501 MESOCAVAL SHUNT IN PORTAL VEIN THROMBOSIS. (Ger.) Bergmann, H., Jr.; Brucke, P. (I. Chirurgische Abteilung, Allgemeines Krankenhaus der Stadt Linz, Krankenhausstrasse 9, A-4020 Linz, Austria). *Wien. Med. Wochenschr.* 127(12):364-368; 1977.

Two cases of mesocaval shunt operation in portal vein thrombosis are reported. Emergency mesocaval shunt operation was performed in a 48-yr-old man with portal hypertension and portal vein thrombosis who had undergone total gastrectomy. Mesocaval shunt was necessary for portal decompression due to massive parenchymal hemorrhage during splenectomy. Mesocaval shunt was performed routinely in a 10-yr-old boy with portal vein thrombosis and umbilical sepsis. The surgery was successful in both cases. Mesocaval shunt is indicated in portal vein thrombosis with ascites and esophageal varices and in children in whom splenorenal shunt is impossible due to the small diameter of the splenic and renal veins. It is also useful in all cases where splenorenal shunt is anatomically impossible, e.g., prehepatic block after extirpation of the spleen, thrombosed splenorenal shunt, intrahepatic block with cicatrization, and shrinkage or inflammation of the hepatoduodenal ligament.

1502 TRANSDUODENOPANCREATIC INTERPOSITION MESOCAVAL SHUNT USING AN INTERNAL JUGULAR VEIN AUTOGRAFT. (Eng.) Moreno Gonzalez, E.; Hebrero San Martin, J.; Solis Herruzo, J. A.; Rico Selas, P.; Rodriguez Agullo, J. L. (Digestive Surgery Dept., Ciudad Sanitaria de la Seguridad Social, Madrid, Spain). *Surg. Gynecol. Obstet.* 145(4): 565-569; 1977.

The use of transduodenopancreatic interposition mesocaval shunt using an internal jugular vein autograft is reported in 26 patients with bleeding esophageal varices, and the modification of this procedure in 4 patients with superior mesenteric vein anatomic abnormalities is described. These abnormalities made the usual subduodenal position of the jugular vein graft impossible. In these patients, a small pancreatectomy was performed between the transverse portion of the duodenum and the right aspect of the superior mesenteric vein, placing the interposition mesocaval shunt in a transduodenopancreatic position. No patient has had any bleeding after the operation, nor have esophageal varices been found at the time of the last examination (24 months after surgery). During this period, all patients showed a remarkable tolerance to proteins, and no patient has been on a low protein diet.

1503 HISTOCHEMICAL ACTIVITY OF γ-GLUTAMYLTRANSPEPTIDASE IN NORMAL AND CHOLESTATIC LIVER: AN INVERSE CORRELATION WITH INTRAHEPATIC ACCUMULATION OF BILE SALTS [Abstract]? (Eng.) Busachi, C. A.; Mebis, J.; Desmet, V. J. (Departement Medische Navorsing, Academisch Ziekenhuis Sint Rafael, Leuven, Belgium). *Digestion* 16(4):341; 1977.

1504 INCREASED TRANSCAPILLARY ESCAPE RATE OF ALBUMIN IN CIRRHOSIS AND ITS RELATION TO ASCITES FORMATION [Abstract]. (Eng.) Henriksen, J. H.; Parving, H. H.; Ranek, L.; Winkler, K.; Lassen, N. A. (Hvidovre Hosp., Copenhagen, Denmark). *Digestion* 16(4):347; 1977.

1505 FACTORS INFLUENCING ASCITES REABSORPTION. RELATIONSHIP TO DIURETIC-INDUCED AZOTAEMIA [Abstract]. (Eng.) Bosch, J.; Arroyo, V.; Sanz, G.; Estrada, L.; Rodes, J. (Hospital Clinico y Provincial, Barcelona, Spain). *Digestion* 16(4): 327; 1977.

1506 PARENTERAL 1,25-DIHYDROXYCHOLECALCIFEROL IN HEPATIC OSTEOMALACIA [Abstract]. (Eng.) Long, R. G.; Varghese, Z.; Meinhars, E.; Skinner, R. K.; Wills, M. R.; Sherlock, S. (Royal Free Hosp., London, England). *Digestion* 16(4):326; 1977.

1507 RENIN SECRETION RATE AND HEPATIC METABOLISM OF RENIN AND ALDOSTERONE IN CIRRHOSIS OF THE LIVER [Abstract]. (Eng.) Bosch, J.; Arroyo, V.; Mauri, M.; Rivera, F.; Navarro, F.; Rodes, J. (Hospital Clinico y Provincial, Barcelona, Spain). *Digestion* 16(4):349-350; 1977.

1508 ENZYME INDUCTION IN CIRRHOTIC PATIENTS DURING SPIRONOLACTONE THERAPY [Abstract]. (Eng.) Miguet, J. P.; Thebaut, A.; Dhumeaux, D. (Hopital Henri Mondor, Creteil, France). *Digestion* 16(4):353-354; 1977.

1509 USE OF β-ADRENERGIC BLOCKADE IN DIURETIC-INDUCED RENAL IMPAIRMENT IN CIRRHOSIS WITH ASCITES [Abstract]. (Eng.) Wilkinson, S. P.; Bernardi, M.; Wheeler, P. G.; Smith, I. K.; Williams, R. (King's Coll. Hosp., Medical Sch., London, England). *Digestion* 16(4):351; 1977.

1510 RADIOGRAPHIC VISUALIZATION OF OUTFLOW TUBE OF LEVEEN SHUNT FOR ASCITES: AN AID IN ASSESSMENT OF POSITION AND FUNCTION [Abstract]. (Eng.) Stanley, M. M.; Supan, W. A. P.; Greenlee, H. B.; Reinhardt, G. F. (Veterans Admin. Hosp., Hines, IL). *Gastroenterology* 73(5):1248; 1977.

1511 BONE DENSITOMETRY AND HISTOLOGY IN NON BILIARY CIRRHOSIS [Abstract]. (Eng.) Van Devanter, G.; Spjut, H.; Snyder, N. (Univ. Texas Medical Branch, Galveston, TX). *Gastroenterology* 73(5):1257; 1977.

1512 PRIMARY BILIARY CIRRHOSIS: COMPLEMENT ACTIVATION AND CHARACTERIZATION OF UNIQUE CIRCULATING IMMUNE COMPLEXES [Abstract]. (Eng.) Wands, J. R.; Dienstag, J. L.; Bhan, A. K.; Feller, E. R.; Isselbacher, K. J. (Massachusetts General Hosp., Boston, MA). *Gastroenterology* 73(5): 1253; 1977.

1513 BILE ACID METABOLISM IN PATIENTS WITH STABLE CIRRHOSIS [Abstract]. (Eng.) von Bergmann, K.; Mok, H. Y. I.; Grundy, S. M. (Veterans Admin. Hosp., La Jolla, CA). *Gastroenterology* 73(5):1253; 1977.

1514 OBSERVATION ON THE POSSIBLE ABSENCE OF A RELATIONSHIP BETWEEN LIVER CELL DAMAGE AND FIBROSIS [Abstract]. (Eng.) Tanyol, H.; (Chestnut Hill Hosp., Philadelphia, PA). *Gastroenterology* 73(5):1249; 1977.

1515 IMPORTANCE OF SCINTIGRAPHIC RESULTS FOR DETERMINING THE PROGNOSIS IN LIVER CIRRHOSIS. (Ger.) Loginov, A. S.; Petrova, O. P. (Zentralen Wissenschaftlichen Forschungsinstitut fur Gastroenterologie der Hauptverwaltung des Gesundheitswesens des Moskauer Exekutivkomitees, Moscow, USSR). *Radiol. Diagn. (Berl.)* 18(2):219-224; 1977.

1516 HEMORRHAGE IN PORTAL HYPERTENSION. (Ger.) Eckert, P.; Kortmann, K. B. (Chirurgische Klinik der Universitat, Martinistr. 2-52, D-2000 Hamburg 20, W. Germany). *Munch. Med. Wochenschr.* 119(37):1175-1178; 1977.

1517 CHOICE OF SURGERY FOR PORTAL HYPERTENSION. (Rus.) Uglov, F. G.; Zubtsovskii, V. N. (I. P. Pavlov First Leningrad Medical Inst., Leningrad, USSR). *Khirurgiia (Mosk.)* (9):3-6; 1977.

1518 SURGICAL TREATMENT OF LIVER CIRRHOSIS COMPLICATED BY ASCITES. (Rus.) Gulman, M. I.; Ershov, Yu. A. (All-Union Scientific Res. Inst. Clinical and Experimental Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (7):14-20; 1977.

1519 ANGIOGRAPHIC ROENTGENOSEMIOTICS OF LIVER CIRRHOSIS IN CHILDREN. (Rus.) Shumsky, V. I. (M. F. Vladimirskii Moscow Oblast Scientific Res. Inst. Clinical Medicine, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):44-52; 1977.

1520 PRACTICAL DIAGNOSTIC PROBLEMS RAISED BY COMPLICATIONS IN THE COURSE OF CIRRHOSIS. (Fre.) Buffet, C.; Labayle, D.; Etienne, J. P. (Hopital Antoine-Beclere, 157, rue de la Porte-de-Trivaux, F 92141 Clamart, France). *Rev. Prat. (Paris)* 26(51):3601-3614; 1976.

1521 CLINICO-MORPHOLOGICAL TRAITS AND SOME ASPECTS OF LIVER CIRRHOSIS PATHOGENESIS. (Rus.) Krutskikh, E. V. (Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Ter. Arkh.* 49(5): 113-116; 1977.

1522 LYMPHATIC VESSELS IN CIRRHOTIC LIVER. (Pol.) Zajac, S. (Z. Kliniki Chorob Naczyn i Transplantologii Instytutu Chirurgii AM w Warsawie i z Centrum Medycyny Doswiadczalnej i

Klinicznej PAN Kierownik Kliniki, Warsaw, Poland). *Pol. Przegl. Chir.* 49(3):329-333; 1977.

1523 DISORDERS OF HEMOSTASIS AND COAGULATION IN CIRRHOSIS. (Fre.) Larrieu, M. J. (Hopital de Bicetre, 94270 Bicetre, France). *Rev. Prat. (Paris)* 26(51):3651-3662, *passim*; 1976.

1524 TREATMENT OF CIRRHOTIC ASCITES. (Fre.) Levy, V. G. (Hopital Saint-Antoine, 184, rue du Faubourg-Saint-Antoine, 75012 Paris, France). *Rev. Prat. (Paris)* 26(51):3627-3637; 1976.

1525 SEA-BLUE HISTIOCYTE SYNDROME IN THAI SIBLINGS. (Eng.) Chainuvati, T.; Piankijagum, A.; Viranuvatti, V.; Silverstein, M. N. (Siriraj Hosp., Bangkok 7, Thailand). *Acta Haematol.* 58(1):58-64; 1977.

1526 HYPERNATREMIA AFTER THE ADMINISTRATION OF LACTULOSE [Letter to Editor]. (Eng.) Kaupke, C.; Sprague, T.; Gitnick, G. L. (Center Health Sciences, Univ. California at Los Angeles, 10833 Le Conte Ave., Los Angeles, CA 90024). *Ann. Int. Med.* 86(6):745; 1977.

1527 C6: SYNTHESIS BY THE LIVER IN VIVO. (Eng.) Hobart, M. J.; Lachmann, P. J.; Calne, R. Y. (Medical Sch., Hills Rd., Cambridge, England). *J. Exp. Med.* 146(2):629-630; 1977.

See also, 0895, 1102, 1106, 1118, 1136, 1227, 1260, 1323, 1365, 1375, 1378, 1384, 1393, 1401, 1403, 1421, 1428, 1459, 1463, 1464, 1475, 1477.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

1528 GALLBLADDER DISEASE--II. UTILIZATION OF THE LIFE TABLE METHOD IN OBTAINING CLINICALLY USEFUL INFORMATION: A STUDY OF 62,739 WEIGHT-CONSCIOUS WOMEN. (Eng.) Bernstein, R. A.; Giefer, E. E.; Vieira, J. J.; Werner, L. H.; Rimm, A. A. (Medical Coll. Wisconsin, 1725 W. Wisconsin Ave., Milwaukee, WI 53233). *J. Chronic Dis.* 30(8):529-541; 1977.

In a cross-sectional study of 62,739 women who were members of a club concerned with weight control problems, cohorts were reconstructed in a study to determine incidence rates and relative risks of gallbladder disease (GBD). The life-table technique was used to compare age-specific subgroups of the population by obesity levels and parity. This cohort analysis allowed the calculation of incidence rates which were used to evaluate risk factors of GBD. Relative risk and probability of GBD were also determined, and their application to a hypothetical patient was demonstrated. The probability of GBD significantly increased with increasing weight, age, and parity, in that order of importance. A multiple regression analysis revealed that obesity accounted for a large portion of the variation of GBD. About 88% of the variation was explained by the linear combinations of obesity, age, and parity. The risk of GBD among extremely obese women in their 20's was greater than six times that of women with normal weight in their 20's. For the entire population under study, the probability of developing GBD by age 60 was estimated to be 32.9/100 women.

1529 ACUTE CHOLECYSTITIS: 137 PATIENTS STUDIED BY INFUSION TOMOGRAPHY OF THE GALLBLADDER. (Eng.) Moncada, R.; Cardoso, M.; Danley, R.; Rodriguez, J.; Kimura, K.; Pickleman, J.; *et al.* (Loyola Univ. Medical Center, Maywood, IL 60153). *Am. J. Roentgenol.* 129(4):583-585; 1977.

Clinical experience with inflammatory cholecystopathy recognized in 137 patients studied by gallbladder infusion tomography is presented. The diagnostic accuracy of acute cholecystitis in 70 patients in whom this condition was suspected was 96% in positive and 94% in negative histologically proven cases. Infusion tomography of the gallbladder is an accurate, rapid, and safe diagnostic aid in the evaluation of acute cholecystitis. In cases of chronic cholecystitis, infusion tomography may be confirmatory but should not be relied on as a final diagnostic test due to a high percentage of false negative cases; only 64% of 18 cases of histologically proven chronic cholecystitis were diagnosed by this method.

1530 ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP) PERFORMED IN CHILDREN. (Eng.) Urakami, Y.; Seki, H.; Kishi, S. (Sch. Medicine, Tokushima Univ., Kuramotocho, Tokushima City, 770, Japan). *Endoscopy* 9(2):86-91; 1977.

Endoscopic retrograde cholangiopancreatography (ERCP) was performed in three children to establish its diagnostic value in young patients. A normal duodenofiberscope (JF-B2) was used with two patients (a 6-yr-old boy and 8-yr-old girl with colic abdominal pains) under general anesthesia and with a 13-yr-old boy (presenting with epigastric pain and abdominal discomfort) after premedication (1 ml Buscopan, i.m., and local anesthesia with xylocain spray). The technique of examination was the same as in adults. ERCP confirmed dilatation of the left hepatic and common bile ducts in the 6-yr-old boy and a cystic stricture of the extrahepatic bile duct and dilatation of the intrahepatic biliary tree in the 8-yr-old girl. ERCP also showed that the distal common bile duct was narrowed in both patients (extirpation of the cyst and hepatojejunostomy were performed). ERCP revealed numerous areas of narrowing and dilatation diffusely scattered throughout the pancreatic duct of the 13-yr-old boy. The common bile duct was partially visualized. Operation and autopsy disclosed a tumorous lesion involving the duct system (Burkitt's lymphoma). ERCP is recommended in every suspected case of choledochal cyst because it is superior to all other procedures in clarifying exactly the extention of the dilatation, the state of the distal common bile duct, and the relation between biliary and pancreatic duct systems; therefore an exact preoperative diagnosis can be made. Improvements in the duodenofiberscope for children may open the new field of ERCP also in newborns for the diagnosis and differentiation of congenital atresia of the common bile duct.

1531 PERCUTANEOUS CHOLANGIOGRAPHY WITH THE OKUDA NEEDLE. (Eng.) Hinde, G. De B.; Smith, P. M.; Craven, J. L. (Llandough Hosp., Nr. Penarth, South Glamorgan, Wales). *Gut* 18(8):610-614; 1977.

The results of percutaneous cholangiography with the Okuda needle in 42 consecutive patients with a clinical diagnosis of obstructive jaundice are presented. The steel needle used was smaller in diameter than the original Okuda needle (0.5 mm, 25 gauge versus 0.7 mm, 27 gauge). An aimed anatomical approach was made from the right flank to the area above the junction of the right and left hepatic ducts; this approach was achieved with the help of two lead markers. Six patients had intrahepatic cholestasis. The technique demonstrated the biliary anatomy in 41 patients, and the radiological diagnosis was confirmed by laparotomy, necropsy, or liver biopsy. There were no significant complications. Laparotomy, when indicated, was performed earlier in the course of the jaundice, and it was avoided in seven patients. Precise knowledge of the site of the obstruction was of great help to the surgeon. This technique represents an important advance in the management of the jaundiced patient. The rarity of complications is attributed to prophylactic antibiotics, the slimness and flexibility of the needle, and the lateral entry point, which provides protection against bile leakage through the thickness of the liver.

1532 PLASMA DISAPPEARANCE AND CONJUGATION OF [^{14}C]CHOLIC ACID IN PATIENTS WITH OBSTRUCTIVE JAUNDICE. (Eng.) Horak, W.; Knoflach, P.; Schuster, E.; Kemmenesi, W.; Grabner, G. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press. (Baltimore, MD): 247-251; 1977.

To investigate what mechanism (i.e., impaired uptake, conjugation, or excretion) is involved in the pathogenesis of impaired bile acid clearance in patients with obstructive jaundice, plasma disappearance and conjugation of i.v.-injected free [^{14}C]-cholic acid were investigated in five healthy subjects and in seven patients with obstructive jaundice. Radioactivity was measured in plasma samples and in the individual plasma bile acid fractions after separation by thin-layer chromatography. Plasma curves of free, conjugated, and total [^{14}C]radioactivity were calculated by an iterative nonlinear least-squares fitting procedure using a computer. A compartment model was applied to estimate the transfer rates of [^{14}C]cholic acid between free and conjugated plasma, liver, and bile compartments. In the patients, the disappearance of total plasma radioactivity was greatly prolonged, while the plasma disappearance of free [^{14}C]cholic acid was nearly normal. The impaired disappearance of total plasma radioactivity could be attributed to a slight decrease of hepatic uptake and to a considerable reflux of conjugated [^{14}C]cholate from liver to plasma. While the conjugation rate was similar to healthy subjects, the biliary excretion rate was practically null in obstructive jaundice. Free [^{14}C]cholic acid plasma clearance may allow an estimation of hepatic bile acid uptake and conjugation independently from disorders of biliary excretion, while large amounts of conjugated [^{14}C]cholate appearing in plasma indicate cholestasis. This test therefore may provide new information for the differential diagnosis of the patient with jaundice.

1533 COMPOSITION OF BILE IN POPULATIONS AT ELEVATED RISK OF CHOLELITHIASIS. (Ita.) Ponz de Leon, M.; Ferenderes, R.; Carulli, N. (Istituto di Clinica Medica Generale e Terapia Medica della Universita, Modena, Italy). *Minerva Med.* 67 (53):3483-3490; 1976.

The cause of cholelithiasis in diabetics and cirrhotics was sought by studying the composition of bile in 14 controlled diabetics, 10 cirrhotics, 15 cholelithiasis patients, and 8 controls. Samples were taken after a fast of at least 12 hr using a double radiopaque catheter so that separate samples of gastric and duodenal juices could be obtained. Study of bile acids, phospholipids, and cholesterol showed a significantly elevated index of saturation in diabetics compared to controls ($p<0.0025$), with a lesser but still significant elevation in cholelithiasis patients ($p<0.01$) and no significant elevation in cirrhosis patients. Elevation of the index was related to a decrease in the level of bile acids and an increase in the level of cholesterol. In terms of total composition (expressed in percent), cholesterol in controls was 5.6 ±

2.0 compared to 9.5 ± 2.5 in diabetics (p=0.005), but 7.5 in cholelithiasis (not significant). In the diabetics and cirrhotics, phospholipids were increased in comparison to controls (18.5 ± 8.3 and 12.7 ± 7.0 versus 16.4 ± 7.9%), but not to a significant level. Bile acids in diabetics, cholelithiasis patients, and cirrhotics were decreased compared to controls, but again not to a significant degree. Thus, there are clear physiopathological changes in bile composition in diabetics to explain the occurrence of cholelithiasis, but no cause for cholelithiasis in cirrhotics was elucidated by these studies.

1534 CHANGES IN BILE LIPIDS ACCOMPANYING OOPHORECTOMY IN A PREMENOPAUSAL WOMAN. (Eng.) Bennion, L. J. (Natl. Inst. Health, 4212 N. 16th St., Phoenix, AZ 85016). *N. Engl. J. Med.* 297(13):709-711; 1977.

Changes in bile lipids were examined in a premenopausal woman (36 yr old) who underwent bilateral oophorectomy. Oophorectomy was carried out because of adenocarcinoma of the endometrium. Bile acid pool size, bile acid composition, and gallbladder bile lipid composition were studied 2 months before and again 3 months after surgery. Whereas there was no substantial change in the relative proportions of bile acids, the size of the total bile acid pool increased from 1,040 mg before to 2,170 mg after the operation. The gallbladder bile cholesterol concentration was decreased after oophorectomy (4.8 after versus 7.0 M% before). Cholesterol saturation was 100% before and 81% after surgery, according to one method and 70% before and 49% after, according to a second method. This change suggests that endogenous ovarian hormones may influence the propensity to gallstone formation in a manner similar to that of exogenous estrogens and progestins.

1535 EFFECT OF PROLONGED FEEDING WITH CHENODEOXYCHOLIC ACID ON BILE IN PATIENTS WITH AND WITHOUT GALLSTONES. (Eng.) Bateson, M. C.; Ross, P. E.; Murison, J.; Bouchier, I. A. D. (Ninewells Hosp. and Medical Sch., Dundee, Scotland). *Gut* 18(8):599-605; 1977.

The effect of prolonged chenodeoxycholic acid therapy on bile cholesterol saturation was studied. Nineteen patients who received chenodeoxycholic acid (750 mg/day) for 6 months had duodenal bile aspirated before and after treatment. In five patients with hypertriglyceridemia but no gallstones, cholesterol saturation was reversed in every case, the mean cholesterol saturation index (SI) changing from 1.38 ± 0.31 to 0.68 ± 0.06 ($p<0.005$). In 14 patients with gallstones, there was also an improvement in bile cholesterol content, but this change was not sufficient to produce mean unsaturation, the SI changing from 1.55 ± 0.52 to 1.13 ± 0.43 ($p<0.05$). Only 7 of 14 patients with gallstones achieved cholesterol unsaturation. In four patients with hypertriglyceridemia and gallstones, mean unsaturation was produced and the SI changed from 1.70 ± 0.45 to 0.86 ± 0.47 ($p<0.05$). When all nine patients with hypertriglyceridemia were grouped, the mean fell from 1.52 ± 0.40 to 0.76 ± 0.30 after therapy ($p<0.001$). In contrast, the 10 patients without hypertriglyceridemia showed no significant fall in SI, which was 1.50 ± 0.54 before and 1.24 ± 0.40 after therapy. The ability of chenodeoxycholic acid feeding to improve bile saturation with cholesterol correlated with the presence of hypertriglyceridemia whether or not gallstones were present. It did not correlate with gallstone dissolution or body weight.

1536 CHANGES OF BILIARY BILE ACIDS IN PATIENTS AFTER ADMINISTRATION OF URSODEOXYCHOLIC ACID. (Eng.) Makino, I.; Nakagawa, S. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press (Baltimore, MD): 211-217; 1977.

The value of ursodeoxycholic acid (UDCA) for gallstone dissolution was studied in 44 patients with radiolucent gallsones. The patients were randomly allocated to one of three treatment regimens: placebo (lactose) or 150 or 600 mg/day of UDCA for 6 months. No patient in the placebo group responded. Unequivocal dissolution of gallstones was observed in 8 of 31 patients receiving UDCA; 38% of the patients receiving the lower dose and 13% of those receiving the higher dose responded. UDCA possessed neither apparent hepatotoxicity nor cathartic activity. Desaturation of biliary cholesterol was induced by UDCA administration, and UDCA in bile increased in proportion to dose of UDCA. The major fecal bile acid of patients receiving UDCA was lithocholate. Serum bile acid levels rose slightly after UDCA treatment (2.4 ± 1.7 µg/ml), and UDCA occupied over 50% of total bile acid. These results confirm the efficacy of UDCA for gallstone dissolution.

1537 STRUCTURAL ALTERATIONS OF THE LIVER IN CHOLELITHIASIS. (Ita.) Marenco, G.; Menardo, G.; Gazzaniga, G. M.; Conti, U. (Istituti Ospedalieri Santa Corona, Pietra Ligure, Italy). *Pathologica* 69(987/988):77-85; 1977.

Structural alterations in the liver were studied in 85 patients with calculi of the gallbladder (60 patients) or of both the gallbladder and the common bile duct (20 patients). Of the 60 patients with calculi of the gallbladder 20 were asymptomatic. Each patient had surgical biopsy of the liver at some distance from the cholelithiasis. Bile duct calculi cause inflammatory infiltration into the portal spaces, proliferation of the bile ducts at the margin of the portal spaces, inflammatory infiltration into the interlobular spaces, and biliary hardening. Gallbladder were characterized by chronic inflammation and fibrotic lesions of the portal spaces. Structural alterations of the liver were most pronounced in patients with a clinical history of frequent attacks of colic. These structural alterations occurred in about 85% of the cases and were different than the morphologic pattern of chronic aggressive hepatitis.

1538 MORTALITY OF OPERATIONS ON GALLBLADDER AND BILE DUCTS PERFORMED IN A TRAINING HOSPITAL.

(Eng.) Schothorst, A. (Dept. Surgery, St. Geertruiden Gast- of Ziekenhuis, Deventer, Netherlands). *Arch. Chir. Neerl.* 29(2):109-116; 1977.

A retrospective study was made of the mortality rate from 990 operations done during a 6-yr period (1967-1972) at the St. Geertruiden Gasthuis of Ziekenhuis to determine whether surgery in a training hospital adversely affected the mortality rate. Five groups of operations were studied: 1) cholecystectomy (397, of which 234 operations were by surgeon), 2) cholecystostomy (5), 3) cholecystectomy plus choledochotomy (504, of which 281 operations were by surgeon), 4) re-exploration or inspection of the biliary tract (44, all by a surgeon), and 5) operations necessitated by malignant neoplasia in the region of the gallbladder or bile ducts and pancreas (40, all by a surgeon). Zero percent surgical mortality was shown in assistant-operated patients, suggesting a low risk factor for patients with biliary tract pathology; the low mortality was attributed to preoperative selection of patients to be operated on by assistants or by surgeons. A higher incidence of complications and mortality is suggested in the group over 70 yr of age, but age was no criterion in determining whether an operation was to be done by an assistant. It is concluded that the training system does not work to the patient's disadvantage.

1539 ULTRASONIC SCANNING IN POSTCHOLECYSTECTOMY CHOLEDOCHOLITHIASIS.

(Eng.) Sapala, M. A.; Steel, W. B.; Resto Soto, A. D.; Sapala, J. A. (Hutzel Hosp. and Wayne State Univ. Sch. Medicine, 4707 St. Antoine, Detroit, MI 48201). *Surgery* 84(4):420-424; 1977.

Four patients underwent ultrasonic scanning of the right upper quadrant for the evaluation of unexplained jaundice and fever. Each patient had undergone a previous cholecystectomy with common bile duct exploration for biliary tract calculi. No patient at that time revealed retained stones on either intraoperative or postoperative cholangiograms. In none of the patients studied was the exact nature of the obstruction appreciated by the clinical and laboratory data. All patients revealed biliary duct dilatation on ultrasound, and the majority demonstrated a bile duct calculus as well. The authors do not recommend that ultrasonic scanning be substituted for p.o. or i.v. cholangiography when the latter can be performed. Nor should ultrasonic scanning be used to replace endoscopic retrograde cholangiopancreatography, percutaneous transhepatic cholangiography, or even liver biopsy if these procedures are indicated and can be completed with a reasonable degree of safety. However, ultrasound can be very helpful in the occasional patient whose biliary tract obstruction defies exact diagnosis when routine dye studies and invasive diagnostic procedures are neither accurate nor feasible.

1540 TRANSAMPULLARY SEPTECTOMY FOR POST-CHOLECYSTECTOMY PAIN.

(Eng.) Moody, F. G.; Berenson, M. M.; McCloskey, D. (Univ. Utah Coll. Medicine, Salt Lake City, UT 84132). *Ann. Surg.* 186(4):415-423; 1977.

A systematic prospective study of transampullary septectomy combined with sphincteroplasty was carried out in patients with severe, long-standing postcholecystectomy pain. Twenty-eight patients had excision of the common wall between the terminal bile duct and duct of Wirsung (ampullary septum). Twenty-two also had a sphincteroplasty; six had had this procedure previously. Pancreatic function studies, scintiscans, ultrasound, and pancreatograms were nondiagnostic. Hyperamylasemia was an uncommon finding. Eight patients had evidence of mild pancreatitis at exploration. There was gross scarring of the ampullary septum in 22 cases. Histologic examination revealed inflammation in 12 septa; the degree of fibrosis could not be assessed, since 14 control septa from autopsy material free from biliary tract disease revealed a comparable degree of collagen and smooth muscle. There were no deaths, and minimal morbidity. In follow-up from 7 to 59 months (mean=26), 16 patients are relatively free of pain, 5 have occasional episodes that require non-narcotic analgesics, and 7 have gained no relief from the operative procedure. A randomized controlled trial is recommended.

1541 INFANTILE HEPATITIS AND CONGENITAL ATRESIA OF BILE DUCTS.

(Eng.) Watanabe, W.; Kobayashi, O. (Niigata Univ. Sch. Medicine, Niigata, Japan). *Acta Med. Biol.* 23(3/4):191-213; 1976.

Etiological, clinical, and histological data on 67 infants with infantile hepatitis and 41 infants with congenital biliary atresia observed from 1961 to 1974 are reported. Comparison of prenatal histories showed that the infants with hepatitis had shorter average gestation, lower birth weights, and familial incidence of disease. Association of other congenital anomalies such as Down's syndrome, microcephalus, and cerebral palsy were observed with Tests for Australia antigen were positive in 1/20 infants with hepatitis tested and negative in all 7 infants with biliary atresia tested. Histological examination of biopsy specimens can readily distinguish between the two diseases in the early stages. Ductal proliferation appears to be the most reliable sign of biliary malformation. The severe cases of infantile hepatitis are difficult to distinguish from biliary atresia. Electron microscopy was the method of choice for differentiating between the two syndromes. Infantile hepatitis and congenital atresia of the bile ducts may be analogous diseases caused by viral infections or noxious agents during the first trimester of pregnancy.

1542 "CYSTS" OF THE COMMON BILE DUCT (DYSPLASIA OF THE COMMON BILE DUCT). (Ita.) Pezzi, A.; Jasonni, V.; Brusori, G. (Policlinico S. Orsola, Bologna, Italy). *Minerva Med.* 67(7):443-450; 1976.

A review of the salient features of cholecystic dysplasia is given. Extrahepatic cholecystic dysplasia is classified into choledochal cysts, choledochal diverticuli, and choledoceles. Choledochal diverticuli cause torsion and strangulation and often result in stenosis, which extends to the superior margin of the pancreas. Choledoceles cause the ampulla of Vater to protrude into the duodenum; there is also some slight tumifaction at the extreme distal end of the biliary-pancreatic path. Congenital ectasia is a severe form of cholecystic dysplasia that causes extensive involvement of the liver and that may result in renal failure. Cases with systemic and intra- and extrahepatic involvement are classified as type IV cholecystic dysplasia and are characterized by involvement of the primary bile duct.

1543 APLASIA OF THE GALLBLADDER WITH COMMON DUCT STONES. (Eng.) Wahlby, L. (Univ. Hosp. Umea, Umea, Sweden). *Acta Chir. Scand.* 143(4):241-243; 1977.

The case of a 79-yr-old woman with gallbladder aplasia and common duct stones is reported. The patient presented with right upper quadrant tenderness and a 2-week history of jaundice. She did not respond to conservative treatment, and the serum bilirubin level increased to 205 μM. A preoperative cholangiography revealed no gallbladder or cystic duct. At laparotomy, the liver was enlarged, icteric, and slightly fibrotic. No gallbladder or cystic duct was present. The common duct was 25 mm wide and contained four faceted stones. The patient remains asymptomatic 4 yr after choledocholithotomy and drainage. Only 22 cases of aplasia of the gallbladder with commmon duct stones have previously been reported.

1544 CARCINOMA OF THE EXTRAHEPATIC BILIARY TRACT: STUDY OF 62 CASES AND REPORT OF THE BRAZILIAN LITERATURE (PART III). (Por.) Filho, P. S. (No affiliation given). *Rev. Bras. Med.* 33(3):104-110; 1976.

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1547 RADIOLOGY OF ACALCULOUS GALL BLADDER DISEASE: A NEW SIGN. (Eng.) Russell, J. G. B.; Keddie, N. C.; Gough, A. L.; Galland, R. B. (Royal Infirmary, Manchester, England). *Br. J. Radiol.* 49(581):420-424; 1976.

1548 BACTERIOLOGICAL INVESTIGATIONS OF BILE FOLLOWING OPERATIONS FOR VARIOUS CONDITIONS. (Ita.) Sianesi, M.; Berri, T. (Istituto di Clinica Chirurgica Generale, Universita degli Studi di Parma, Parma, Italy). *Chir. Ital.* 28(4):341-355; 1976.

1549 COMMON BILE DUCT IN ACUTE CHOLECYSTITIS: REPORT OF 116 CASES. (Ita.) Dell'Anna, B.; Sianesi, M.; Paroni, R. (Istituto di Patologia Speciale Chirurgica, Universita degli Studi di Parma, Parma, Italy). *Chir. Ital.* 28(1):39-62; 1976.

1550 ANATOMO-SURGICAL ASPECTS OF PEROPERATIVE CHOLANGIOGRAPHY IN BILIARY LITHIASIS. (Ita.) Bianca, T.; Fusto, A.; Donati, A.; Morici, V. (Istituto di Anatomia Chirurgica dell'Universita di Catania, Catania, Italy). *Chir. Ital.* 28(1):18-38; 1976.

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1552 TREATMENT OF LITHIASIS OF THE COMMON BILE DUCT: 338 SPHINCTEROTOMIES WITHOUT DRAINAGE OF THE COMMON DUCT, OVER A TEN YEAR PERIOD. (Fre.) Bancaud, E. (No affiliation given). *Chirurgie* 102(6):462-465; 1976.

1553 PERENDOSCOPIC TREATMENT OF BILIARY TRACT CALCULI. (Fre.) Liguory, C.; Leger, L. (No affiliation given). *Chirurgie* 102(6):466-473; 1976.

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Generale dell'Universita di Catania, Catania, Italy). *Chir. Ital.* 28(2):152-162; 1976.

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See also, 1090, 1095, 1097, 1099, 1101, 1102, 1106, 1108, 1117, 1131, 1132, 1134, 1227, 1231, 1232, 1234, 1260, 1270, 1315, 1323, 1350, 1375, 1377, 1384, 1391, 1397, 1477.

GENERAL

1619 RELATIVE IMPORTANCE OF VIRUSES AND BACTERIA IN THE ETIOLOGY OF PEDIATRIC DIARRHEA IN TAIWAN. (Eng.) Echeverria, P.; Ho, M. T.; Blacklow, N. R.; Quinnan, G.; Portnoy, B.; Olson, J. G.; Conklin, R.; *et al.* (Harvard Medical Sch., 25 Shattuck St., Boston, MA 02115). *J. Infect. Dis.* 136(3):383-390; 1977.

Eighty Taiwanese children with diarrhea were studied to determine the relative importance of (a) reovirus-like agent (RVLA), (b) *Escherichia coli* that produce heat-stable and heat-labile toxin, (c) invasive *E. coli*, (d) *Salmonella*, *Shigella*, and *Vibrio*, (e) enteroviruses, and (f) parasites in the etiology of pediatric diarrhea. Of 75 patients tested for evidence of infection with RVLA by electron microscopy of stools and/or by assays of complement-fixing and immunofluorescent antibody response to the serologically related Nebraska calf diarrhea virus, 42 were positive. Of children whose stools contained the agent, 90% showed a fourfold or greater rise in titer of immunofluorescent antibodies, and 85% developed a fourfold or greater rise in titer of complement-fixing antibodies to the agent. Strains of *E. coli* producing only heat-labile toxin (LT) were isolated from 7% of 57 ill children who had not received previous antibiotics and from 4% of 131 healthy control children (p=0.49). Strains of *E. coli* producing only heat-stable toxin (ST) were isolated from 5 of 57 age-matched children in the 131 healthy controls tested. Invasive *E. coli* were not found. In addition, three of six children with bacterial and/or serological evidence of an infection with LT-producing *E. coli* and four of five children infected with ST-producing *E. coli* had infections with RVLA. RVLA appeared to be the major cause of diarrheal illness in Taiwan during the summer of 1975, whereas toxigenic *E. coli* appeared to be responsible for a smaller proportion of pediatric enteritis.

1620 SYMPTOMATIC TREATMENT OF DIARRHEA WITH BISMUTH SUBSALICYLATE AMONG STUDENTS ATTENDING A MEXICAN UNIVERSITY. (Eng.) DuPont, H. L.; Sullivan, P.; Pickering, L. K.; Haynes, G.; Ackerman, P. B. (6400 West Cullen St., Houston, TX 77030). *Gastroenterology* 73(4, Part 1):715-718; 1977.

The value of bismuth subsalicylate in the symptomatic treatment of diarrhea was studied in students attending a Mexican university who developed diarrhea. One hundred eleven students were given 30 ml each half hour until eight doses (total dose of active drug, 4.2 g) were given, and 58 students received twice this dose (8.2 g of active drug) over the 3.5-hr treatment period. The number of unformed stools was significantly decreased in both bismuth subsalicylate treatment groups compared to the placebo controls for the period 4 to 24 hr after therapy. A reduction in diarrhea was additionally noted for the duration of the 48-hr surveillance period for the students receiving the higher dose of active drug. Subjective relief within 24 hr of therapy of the symptoms of diarrhea, nausea, and abdominal pain or cramps was reported with a significantly increased frequency in the bismuth subsalicylate group. The most pronounced effect of the treatment occurred in the United States students with diarrhea who had recently arrived in Mexico. This appeared to be related to the favorable effect of bismuth subsalicylate on the course of toxigenic *Escherichia coli* infection. The thirty-two students with shigellosis did not experience a prolonged illness in either treatment group. Bismuth subsalicylate is effective in reducing diarrhea, regardless of etiology.

1621 THORACIC SPINAL CORD TUMOR PRESENTING WITH DYSAUTONOMIC DIARRHEA. (Eng.) Fricke, R. D.; Romine, J. S. (Veterans Admin. Section, 3350 La Jolla Village Drive, San Diego, CA 92161). *Gastroenterology* 73(5):1152-1156; 1977.

The case of a 52-yr-old man with an ependymoma who presented with dysautonomic diarrhea is described. The patient had incapacitating diarrhea of 1-month duration and developed orthostatic hypotension and progressive long tract central nervous system signs. No enteric disease was found to account for the diarrhea. An intramedullary midthoracic spinal cord tumor was found. Diarrhea and hypotension resolved after local cord decompression and irradiation of the tumor. Dysmotility caused by interruption of thoracic sympathetic pathways to the gut was considered responsible for the diarrhea, and altered splanchnic hemodynamics for the hypotension. The regional autonomic neuroanatomy and the known effects of the autonomic nervous system upon bowel function and the splanchnic circulation explain the patient's symptoms.

1622 MASSIVE RECURRENT HEMORRHAGE OF THE DISTAL PART OF THE DIGESTIVE TRACT DUE TO HEREDITARY HEMORRHAGIC TELANGIECTASIA (OSLER'S SYNDROME). (Fre.) Besson, A.; Saegesser, F. (Service de Chirurgie A, CHUV, CH-1011 Lausanne, Switzerland). *Schweiz. Med. Wochenschr.* 107(30):1057-1064; 1977.

Hereditary hemorrhagic telangiectasia was diagnosed in a 67-yr-old woman with multiple angiomas of the head, trunk, and fingers by emergency selective angiography of the celiac trunk and superior and inferior mesenteric arteries during uncontrollable rectal hemorrhage. The investigations revealed a large arteriovenous fistula in the cecal region, originating from a large ruptured telangiectasia. Right hemicolectomy with anastomosis between the ileum and ascending colon under angiographic control of the resected specimen was successful; the patient was in good condition more than 1 yr after surgery. The patient's brother has the same disease, and their mother had frequent epistaxis, a typical sign of telangiectasia.

1623 REGULATION OF POOL SIZE OF BILE ACIDS IN MAN. (Eng.) Mok, H. Y. I.; von Bergmann, K.; Grundy, S. M. (Veterans Admin. Hosp., 3350 La Jolla Village Drive, San Diego, CA 92161). *Gastroenterology* 73(4, Part 1):684-690; 1977.

Various components of the enterohepatic circulation were investigated in 33 subjects to determine their effects on bile acid pool size. Seven patients had increases in plasma cholesterol with near normal triglycerides, and six others had raised plasma triglycerides. The pool size and secretion rates of bile acids were measured using an intestinal perfusion method, and bile acid synthesis was determined by fecal excretion. From these measurements, cycling frequency of the pool and intestinal absorption of bile acids were calculated. The results were analyzed for the group as a whole and for four subgroups based on incremental pool sizes (1-2 g, 2-3 g, 3-4 g, and >4 g). Factors that should regulate pool size are synthesis, absorption efficiency, and cycling frequency of the pool. In subjects with relatively low pools, steady state synthesis and absorption of bile acids were not reduced. However, two other factors appeared to be especially important in keeping pool sizes in the lower ranges--a high cycling frequency and overly sensitive feedback inhibition of bile acid synthesis. First, there was a significant inverse correlation between cycling frequency and pool size. Theoretically, a high cycling frequency should reduce pools in two ways--by suppressing synthesis and by increasing fecal losses. Second, in patients with low pools, transhepatic flux of bile acids was also reduced, and daily synthesis of bile acid, although being in the same range as those with larger pools, was inappropriate for the magnitude of the flux. With this overactive feedback on bile synthesis, these patients were unable to increase their bile acid synthesis to supranormal levels so as to cause a reexpansion of the pool to higher levels.

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1672 CLINICAL SYMPTOMATOLOGY IN HEMORRHAGIC TELANGIECTASIA. (Rus.) Sukhomlinov, A. B. (Stavropol Medical Inst., Stavropol, USSR). *Sov. Med.* (5):100-103; 1977.

1673 MOTOR EVACUATORY FUNCTION OF THE INTESTINES IN PATIENTS WITH SALMONELLOSIS. (Rus.) Yushchuk, N. D.; Utekhin, V. A. (Moscow Medical Stomatology Inst., Moscow, USSR). *Sov. Med.* (5):137-138; 1977.

1674 SECONDARY HYPERLIPOPROTEINEMIA. (Ger.) Bruns, W. (Zentralinstitut fur Diabetes, Greifswalder Strasse 11a, DDR-2201 Karlsburg, E. Germany). *Z. Gesamte Inn. Med.* 32(9):133-137; 1977.

1675 SALIVARY CALCINOSIS. (Fre.) Laudenbach, P.; Bonneau, E.; Top, T.; Tran, C. P. (Centre Hospitalier de Bicetre, 78, rue General-Leclerc, F 94270 Le Kremlin-Bicetre, France). *J. Radiol. Electrol. Med. Nucl.* 58(6/7):413-418; 1977.

See also, 1035, 1036, 1040, 1059, 1072, 1073, 1076, 1083, 1090, 1114, 1115, 1116, 1118, 1129, 1139, 1217, 1232, 1244, 1265, 1270, 1271, 1274, 1279, 1298, 1318, 1341, 1390, 1473, 1606, 1617.

GENERAL

Parasitology

1676 HUMAN CHRONIC MANSONIAN SCHISTOSOMIASIS--CELL PROLIFERATION AND FIBRE FORMATION IN THE HEPATIC SINUSOIDAL WALL: A MORPHOMETRIC, LIGHT AND ELECTRON-MICROSCOPY STUDY. (Eng.) Canto, A. L.; Sesso, A.; De Brito, T. (Faculdade de Medicina de Sao Paulo, Sao Paulo Univ., Sao Paulo, Brazil). *J. Pathol.* 123(1):35-44; 1977.

The correlation between sinusoidal cells and reticulin fiber proliferation was studied in human chronic schistosomiasis mansoni. A morphometric, light and electron microscopic study of the sinusoids in biopsy or necropsy specimens from 10 patients without hepatic disease, and 19 patients with schistosomiasis (10 with the intestinal form not exhibiting hypertension, and 9 with the hypertensive, hepatosplenic form) showed a sequence of events beginning with an increased number of cell nuclei, particularly evident at the centrilobular region. This was followed by deposition of reticulin fibers along the perisinusoidal space. Later, increased numbers of cells and reticulin fibers were seen throughout the lobule. Other findings, such as reduplication of the sinusoidal lining and the focal appearance beneath the cell layer of the thin discontinuous membrane, also occurred. This perisinusoidal fibrosis may add an element of heightened intrasinusoidal pressure to the perisinusoidal hypertension already present. The hepatic sinusoids in schistosomiasis mansoni receive mainly arterial blood. High intraluminal pressure may be one explanation of the perisinusoidal fibrosis in these cases. However, as it possibly occurs in primary sinusoidal portal hypertension, chronic immunological stimulation leading to proliferation of Kupffer cells and lipocytes may be an alternative mechanism. Whatever the pathogenetic mechanism, the livers of patients with chronic schistosomiasis mansoni exhibit a progressive sinusoidal reaction to injury.

1677 CONTROL OF Schistosoma mansoni TRANSMISSION BY CHEMOTHERAPY IN ST. LUCIA. I. RESULTS IN MAN. (Eng.) Cook, J. A.; Jordan, P.; Bartholomew, R. K. (Ministry Health, P.O. Box 93, Castries, St. Lucia, West Indies). *Am. J. Trop. Med. Hyg.* 26(5, Part 1):887-893; 1977.

Two-year results of a program for the control of schistosomiasis in St. Lucia are presented. *Schistosoma mansoni* transmission was controlled by treating all infected persons in Marquis Valley (population about 3,100), St. Lucia with hycanthone; children under 3 yr or weighing less than 15 kg received niridazole or lucanthone hydrochloride. Excluding 26 pregnant patients, 709 of 729 persons who were found to be infected received treatment the first year. Six hundred and seventy-seven patients were given a single injection of hycanthone (2.5 mg/kg), and the same treatment was administered to 150 patients in the second year. Side-effects were not severe; the major side-effect, vomiting, occurred in about 22% on both occasions. In villages with initially high transmission rates, the incidence of new infections in children 0 to 14 yr fell from 20.8% before chemotherapy to 7.4% after 1 yr and to 3.7% after 2 yr. This pattern was significantly different from that in the comparison area where no control scheme exists. Chemotherapy alone appears to be a rapid effective, and comparatively inexpensive method of controlling *S. mansoni* transmission in St. Lucia.

678 CONTROL OF Schistosomiasis mansoni TRANSMISSION BY CHEMOTHERAPY IN ST. LUCIA. II. IOLOGICAL RESULTS. (Eng.) Christie, J. D.; Upa-ham, E. S. (Ministry Health, P.O. Box 93, Castries, St. Lucia, West Indies). *Am. J. Trop. Med. Hyg.* 26 (5, Part 1):894-898; 1977.

Studies were carried out to determine whether a schistosomiasis chemotherapy program had any effect on infection rates in the intermediate snail host in St. Lucia, *Biomphalaria glabrata*. Chemotherapy of all persons infected with *Schistosoma mansoni* was begun in Marquis Valley, St. Lucia, in March 1974. From January 1972 to the start of chemotherapy, the infection rate in field *B. glabrata* collected in the valley was 1.09% (117/10,736), and the rate in sentinel *B. glabrata* was 1.48% (56/3,790). From March 1974 through December 1975, no infections were detected in either field snails (11,742 collected) or sentinel snails (3,230 exposed). The accumulated data suggest that, because of differences in topography and average annual rainfall, *S. mansoni* transmission occurs in this valley during the rainy season, whereas in other St. Lucian valleys under study it occurs during the dry season.

1679 A STUDY OF THE PRESENCE OF CIRCULATING IMMUNE COMPLEXES IN SCHISTOSOMIASIS. (Eng.) Smith, M. D.; Verroust, P. J.; Morel-Maroger, L.; Geniteau, M.; Coulaud, J. P. (Hopital Tenon, 75020 Paris, France). *Trans. R. Soc. Trop. Med. Hyg.* 71(4):343-348; 1977.

The sera of 51 patients with schistosomiasis were studied for the presence of circulating immune complexes (IC) using two methods, inhibition of complement-coated sheep RBC-anti Ig complex (EAC) rosette formation and precipitation of radiolabeled complement component Clq (Clq). The percentage EAC rosette inhibition was significantly greater in the total group of patients compared to the control sera. The material inhibiting EAC rosette formation was precipitable by 4% polyethylene glycol, thus excluding the role of C3 fragments and suggesting that inhibition was due to immune complexes. Using precipitation of radiolabeled Clq, significantly high values compared to control sera were only obtained in those patients before treatment or with an active infection (p=0.003). The results suggest that material behaving as IC is present in the sera of patients with schistosomiasis and that measurement of the levels of IC may be important in assessing the state of the disease.

1680 IMMUNE RESPONSES DURING HUMAN SCHISTOSOMIASIS MANSONI. II. OCCURRENCE OF EOSINOPHIL-DEPENDENT CYTOTOXIC ANTIBODIES IN RELATION TO INTENSITY AND DURATION OF INFECTION. (Eng.) Sher, A.; Butterworth, A. E.; Colley, D. G.; Cook, J. A.; Freeman, G. L., Jr.; Jordan, P. (Harvard Medical Sch., 250 Longwood Ave., Boston, MA 02115). *Am. J. Trop. Med. Hyg.* 26(5, Part 1): 909-916; 1977.

Plasma samples from St. Lucians were tested for the presence of antibodies that cooperate *in vitro* with normal human WBC in causing cytotoxic damage to schistosomula of *Schistosoma mansoni*. The *in vitro* antibody activity, which has been previously shown to depend on eosinophil effector cells, was detected in 56% of the individuals with known, current *S. mansoni* infections and in 14% of control subjects from the same endemic area. Quantitatively, eosinophil dependent cytotoxic antibody (EDCA) activity, when expressed as the maximum amount of damage to schistosomula induced at high plasma concentration, correlated significantly with the intensity of *S. mansoni* infection as determined by fecal egg count, the highest levels of activity occurring in patients with stool counts of 60 eggs/ml or greater. In addition, plasma EDCA activity correlated with the *in vitro* blastogenic responsiveness of patients' lymphocytes to three different parasite antigen preparations. In contrast, titrations of EDCA activity failed to reveal a relationship between EDCA titer and the most recent egg count performed on each subject. However, a significant correlation was observed when titers were compared to egg counts averaged over a 3-yr period. Neither maximal EDCA activity nor titer correlated with the duration of known schistosome infection.

1681 IMMUNE RESPONSES DURING HUMAN SCHISTOSOMIASIS MANSONI. III. REGULATORY EFFECT OF PATIENT SERA ON HUMAN LYMPHOCYTE BLASTOGENIC RESPONSES TO SCHISTOSOME ANTIGEN PREPARATIONS. (Eng.) Colley, D. G.; Hieny, S. E.; Bartholomew, R. K.; Cook, J. A. (Veterans Admin. Hosp., Nashville, TN 37203). *Am. J. Trop. Med. Hyg.* 26(5, Part 1):917-925; 1977.

The capability for *in vitro* blastogenesis of lymphocytes from 38 patients with schistosomiasis mansoni was tested against phytohemagglutinin (PHA), *Candida albicans* extract, and soluble preparations of schistosome eggs (SEA), adult worms (SWAP), or cercariae (CAP). When patients' lymphocytes were cultured in medium that contained 5% human (homologous) normal (uninfected) serum, they responded well to PHA and *Candida* extract. The responses induced by SEA were maximal in patients with early *Schistosoma mansoni* infections, while reactivity against SWAP and CAP increased during chronic infection. These responses, induced by the schistosome-derived antigenic preparations, were suppressed if the homologous-normal serum supplement of the culture medium was replaced with either the patient's own (autologous) serum, or that of another patient infected with *S. mansoni*. All sera were heat-inactivated (56 C for 30 min) prior to use. In contrast, responses against the nonspecific mitogen (PHA) and the unrelated antigen (*Candida* extract), were not altered by these changes of the serum supplementation of the media. The degree of suppression by patient serum was not changed by increasing the serum percentage in the medium from 5% to 25%. The suppressive effects of patient sera on responses induced by SEA and SWAP were increased in relation to the duration of the serum donor's *S. mansoni* infection. Preincubation of lymphocytes in suppressive patient sera for 30 min at 37 C did not reduce the expected level of responsiveness if the cells were subsequently cultured in homologous-normal serum supplemented medium. The data indicate that during *S. mansoni* infection, patients develop serum component(s) that specifically interfere with the responsiveness of their lymphocytes in regard to certain schistosome-derived antigenic preparations. The immunoregulatory events described could participate in the modulation of immunopathology, the maintenance of chronic adult worm survival, and the prevention of full expression of protective immune responses.

1682 SINGLE-DOSE TREATMENT OF GIARDIASIS WITH TINIDAZOLE [Letter to Editor]. (Eng.) Danzig, S.; Hatchuel, W. L. F. (Alexandra Health Center and Univ. Clinic, P.O. Bergvlei, Tvl, South Africa). *S. Afr. Med. J.* 52(18):708; 1977.

1683 HEPATIC LINGUATULIASIS IN MAN. (Fre.) Lapierre, J.; Tourte-Schaefer, C.; Vinh Hien, T.; Holler, C.; Bouchard, J.; Deslignieres, S.; *et al.* (Hopital Cochin, 27, rue du Faubourg Saint-Jacques, Paris 14e, France). *Bull. Soc. Pathol. Exot.* 69(5):450-456; 1976.

1684 CLINICAL ASPECTS OF AMEBIASIS. (Ger.) Gyr, K. (Departement fur Innere Medizin, Universitat Basel, Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107(18):639-640; 1977.

1685 EXPERIMENT WITH HYCANTHONE IN 3,100 PATIENTS WITH SCHISTOSOMIASIS MANSONI. (Por.) Buaiz, V.; Sandoval Goncalves, C.; Zanotti, W. M.; Semedo Boni, E.; Pereira, F. E. L. (Dep. de Clin. Med., Univ. Fed. do Espirito Santo, Brazil). *Rev. Assoc. Med. Bras.* 22(5):171-174; 1976.

1686 PERSONAL EXPERIENCE WITH HYCANTHONE AND OXAMINIQUINE IN THE TREATMENT OF SCHISTOSOMIASIS MANSONI. (Por.) Pedro, J. R.; Amato Neto, V. (Departamento de Clinica Medica, Universidade Estadual de Campinas, Campinas, Brazil). *Rev. Bras. Clin. Ter.* 5(8):327-330; 1976.

See also, 0798, 0962, 1052, 1107, 1646, 1650, 1668.

GENERAL

Regional Enteritis

1687 CROHN'S DISEASE INVOLVING THE COLON: AN AUDIT OF CLINICAL MANAGEMENT. (Eng.) Allan, R.; Steinberg, D. M.; Williams, J. A.; Cooke, W. T. (General Hosp., Birmingham B46NH, England). *Gastroenterology* 73(4, Part 1):723-732; 1977.

The clinical management of 204 patients with Crohn's disease involving the colon who have been reviewed at 3- to 6-month intervals for up to 34 yr (mean 13.1 ± 8.7 yr) are described. The results were analyzed to define the morbidity, mortality, and long-term prognosis of the disorder. Despite a high morbidity, the long-term prognosis was good. Although the mean interval since the onset of symptoms was more than 13 yr, 77% of the patients were symptom-free and 60% had normal laboratory indices. This analysis suggests that until the etiology of Crohn's disease is established and a specific therapy is developed, good results can be obtained with regular medical review and appropriate surgical treatment with the limited use of corticosteroids and the minimal use of immunosuppressive agents or total parenteral nutrition.

1688 SELECTIVE IgA DEFICIENCY AND CROHN'S DISEASE: REPORT OF TWO CASES. (Eng.) Hodgson, H. J. F.; Jewell, D. P. (Royal Free Hosp., London, England). *Gut* 18(8):644-646; 1977.

Two patients with Crohn's disease and selective IgA deficiency are described. Serum IgA was undetectable in each case, and immunoperoxidase studies of the lamina propria showed a gross diminution of IgA-bearing plasma cells. Peripheral blood lymphocytes, however, showed normal numbers of IgA-bearing lymphocytes (2.3% and 6.8% of total lymphocytes in each patient, resp.). The typical clinical course and histology in these two patients suggest that IgA-mediated responses in the mucosa are not involved in the pathogenesis of Crohn's disease.

1689 HLA AND B-CELL ANTIGENS IN PATIENTS WITH CROHN'S DISEASE [Abstract]. (Eng.) Cohen, Z.; Wolfe, E.; Papasteriadis, C.; Werner, C.; Festenstein, H. (London Hosp. Medical Coll., London, England). *Clin. Res.* 25(5):687A; 1977.

1690 STUDIES OF SPECIFIC AND NONSPECIFIC RESISTANCE IN CROHN'S DISEASE [Abstract]. (Eng./Ger.) Heymer, B.; Feyerabend, G.; Haferkamp, O.; Herfarth, C. (Abt. fur Pathologie der Universitat, Steinhovelstr. 9, D-7900 Ulm, W. Germany). *Langenbecks Arch. Chir.* 345:587; 1977.

1691 SURGICAL THERAPY OF CROHN'S DISEASE [Abstract]. (Eng./Ger.) Pridun, N.; Olbert, F.; Kobinia, G.; Russe, O. J. (1. Chir. Abt. des KH der Stadt Wien-Lainz, Wolkersbergenstr. 1, A-1130 Wien, Austria). *Langenbecks Arch. Chir.* 345:587-588; 1977.

1692 PROBLEMS OF ACUTE POSTOPERATIVE EXACERBATION IN CROHN'S DISEASE [Abstract]. (Eng./Ger.) Krieg, H.; Gronninger, J. (Chirurgische Univ.-Klinik, Langenbeckstrasse 1, D-6500 Mainz 1, W. Germany). *Langenbecks Arch. Chir.* 345:588; 1977.

1693 PATIENT'S AND DOCTOR'S DELAYS IN THE DIAGNOSIS OF CROHN'S DISEASE [Abstract]. (Eng.) Jarnerot, G.; Pihl, O.; Aberg, C. (Region Hosp., Linkoping, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):43; 1977.

See also, 1235, 1262, 1290, 1301, 1318, 1320, 1323, 1326, 1328, 1329, 1331.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *International Standard ISO833, 1974*, are used. The two-letter state abbreviations are based on the United States Postal Service Code.

LANGUAGE ABBREVIATIONS

Afrikaans	Afr.
Albanian	Alb.
Arabic	Ara.
Armenian	Arm.
Azerbaijani	Aze.
Belorussian	Bel.
Bengali	Ben.
Bulgarian	Bul.
Burmese	Bur.
Chinese	Chi.
Croatian	Cro.
Czechoslovakian	Cze.
Danish	Dan.
Dutch	Dut.
English	Eng.
Esperanto	Esp.
Estonian	Est.
Finnish	Fin.
Flemish	Fle.
French	Fre.
Gaelic	Gae.
Georgian	Geo.
German	Ger.
Greek	Gre.
Hausa	Hau.
Hebrew	Heb.
Hindi	Hin.
Hungarian	Hun.
Icelandic	Ice.
Indonesian	Ind.
Interlingua	Int.
Italian	Ita.
Japanese	Jpn.
Kirghiz	Kir.
Korean	Kor.
Latin	Lat.
Latvian	Lav.
Lithuanian	Lit.
Marathi	Mar.
Masai	Mas.
Multilingual	Mlt.
Norwegian	Nor.
Persian	Per.
Polish	Pol.
Portuguese	Por.
Pushto	Pus.
Rumanian	Rum.
Russian	Rus.
Serbian	Ser.
Slovak	Slo.
Slovene	Slv.
Spanish	Spa.
Swahili	Swa.
Swedish	Swe.
Tagalog	Tag.
Tamil	Tam.
Telugu	Tel.
Thai	Tha.
Turkish	Tur.
Ukranian	Ukr.
Urdu	Urd.
Vietnamese	Vie.
Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED$_{50}$	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K$_m$	Michaelis constant
LD$_{50}$	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

1694 SMALL BOWEL MORPHOLOGY AND EPITHELIAL PROLIFERATION IN INTRAVENOUSLY ALIMENTED RABBITS. (Eng.) Eastwood, G. L. (West Roxbury Veterans Admin. Hosp., 1400 Veterans of Foreign Wars Parkway, West Roxbury, MA 02132). *Surgery* 82(5):613-620; 1977.

To determine whether alterations in epithelial renewal accompany the morphological changes observed in experimental animals on i.v. alimentation, cell proliferation and the light and electron microscopic appearance of the small bowel were investigated in i.v. and p.o. alimented rabbits. After 10 days of either i.v. or p.o. alimentation, ^{3}H-thymidine was given i.v. to all animals, and 1 hr later sections of duodenum, upper jejunum, and distal ileum were taken for autoradiography and light and electron microscopy. Parenteral alimentation was accompanied by significant reductions in epithelial cell proliferation and mucosal thickness in the proximal small bowel. The density of goblet cells was greater in the duodenum and jejunum, but less in the ileum, of i.v. alimented rabbits than in corresponding areas of the animals fed p.o. Furthermore, ultrastructural changes in the villous absorptive cells of i.v. alimented rabbits, such as lengthened microvilli and increased numbers of multivesicular bodies, suggest that epithelial migration also may be slowed during parenteral alimentation.

1695 THE EFFECT OF INTESTINAL RESECTION ON THIRY-VELLA FISTULAE OF JEJUNAL AND ILEAL ORIGIN IN THE RAT: EVIDENCE FOR A SYSTEMIC CONTROL MECHANISM OF CELL RENEWAL. (Eng.) Hanson, W. R.; Rijke, R. P. C.; Plaisier, H. M.; Van Ewijk, W.; Osborne, J. W. (Div. Biological and Medical Res., Argonne Natl. Lab., Argonne, IL 60439). *Cell Tissue Res.* 10(6):543-555; 1977.

To test the hypothesis that steady state cell renewal in the intestinal epithelium is maintained by a systemic, rather than a local, mechanism, the effect of 60% mid-intestinal resection on Thiry-Vella fistulae of both jejunal and ileal origin was studied in rats. Hypoplasia occurred in fistulae without resection of the remaining intestine in continuity. Cell counts of crypt and villus columns and tritiated thymidine uptake in isolated whole crypts were reduced. Scanning electron microscopy showed marked hypoplastic alterations in villi. However, when 60% of the intestine in continuity was resected, hyperplasia occurred not only in the residual intestine but in the fistulae of both jejunal and ileal origin. Cell counts of villus and crypt columns were increased along with increased tritiated thymidine uptake per crypt. Neutral α-glucosidase and nonspecific esterase activities did not change as a result of resection, but the activities of both enzymes were greater in ileal fistulae than in ileum *in situ*. Observations on the different resection response of the jejunal versus ileal fistulae lead to a distinction between inherent and induced differences within the small intestine. This study suggests a systemic control of cell renewal.

1696 MORPHOLOGICAL CHANGES INDUCED BY CYCLOPHOSPHAMIDE IN CRYPT EPITHELIUM OF THE SMALL INTESTINE IN MICE: LIGHT AND ELECTRON MICROSCOPIC STUDIES. (Eng.) Sobhon, P.; Wanichanon, C.; Sretarugsa, P. (Dept. Anatomy, Mahidol Univ., Rama VI Rd., Bangkok 4, Thailand). *Am. J. Anat.* 149(4):563-584; 1977.

The extent of mitotic inhibition and cellular injury in the intestinal crypts were studied in female Swiss mice following the i.p. injection of a single sublethal dose (300 mg/kg) of cyclophosphamide. Within 1 hr, light microscopic observations indicated that mitotic activity of epithelial cells had decreased, reaching the lowest level at 16 hr. An abnormally high number of lymphocytes and cells with eosinophilic granules appeared in the epithelium; later these cells degenerated, and the maximum number of dead cells was observed at 6 hr after the drug injection. At 4 days post-injection, the morphology of crypt epithelium had returned to normal. Electron microscopy revealed that, although the mitotic activity of crypt epithelial cells was depressed, there was little change in their morphology following the drug administration. However, many intermediate stages of degeneration of lymphocytes and eosinophilic cells were observed in the intercellular spaces as well as apparently inside the cytoplasm of crypt epithelial cells. The eosinophilic cells are characterized by the presence of large crystal-containing granules in the cytoplasm, and are believed to be equivalent to "globular leukocytes" described by many investigators. Evidence from this study suggests that lymphocytes and globular leukocytes are more sensitive to cyclophosphamide than are crypt epithelial cells, and that they degenerate in crypt epithelium.

1697 HUMAN ROTAVIRUS ENTERITIS INDUCED IN CONVENTIONAL PIGLETS: INTESTINAL STRUCTURE AND TRANSPORT. (Eng.) Davidson, G. P.; Gall, D. G.; Petric, M.; Butler, D. G.; Hamilton, J. R. (Hosp. Sick Children, Toronto, Ontario, Canada). *J. Clin. Invest.* 60(6):1402-1409; 1977.

To better understand the pathogenesis of infantile viral gastroenteritis, Na^+ and Cl^- fluxes were studied *in vitro* in short-circuited jejunal epithelium from 8- to 10-day-old piglets after infection with a standard p.o. dose of human rotavirus. Eleven infected piglets, all of whom became ill, were compared with nine uninfected, healthy littermates. When killed 72 hr after infection, the intestinal villi were shorter and crypts deeper ($p<0.025$) in the duodenum, upper jejunum, and mid-small intestine, but not ileum, as compared to control tissue. Virus antigen was seen by fluorescence microscopy in occasional jejunal villus tip cells in only four infected piglets and in none of the controls at 72 hr. Net Na^+ and Cl^- fluxes did not differ from noninfected litter-mate controls under basal conditions, but the response to glucose was blunted in infected piglets ($p<0.001$). Theophylline-stimulated net Cl^- secretion in both infected and control animals, and cyclic AMP concentration in isolated jejunal villus enterocytes did not differ significantly. In isolated jejunal villus enterocytes of infected piglets, thymidine kinase activity increased ($p<0.001$), and sucrase activity decreased ($p<0.001$). It is concluded that in invasive enteritis caused by a major human viral pathogen, glucose-coupled Na^+ transport is impaired in the jejunum at a time when the villus epithelium shows enzyme characteristics of crypt epithelium, and when little or no virus is present. These findings are identical to those occurring in an invasive coronavirus enteritis of piglets but differ markedly from those seen with enterotoxigenic diarrhea.

1698 IMMUNO-ELECTRON-CYTOCHEMICAL LOCALIZATION OF THE SOMATOSTATIN CELLS IN THE HUMAN ANTRAL MUCOSA.

(Eng.) Canese, M. G.; Bussolati, G. (Istituto di Anatomia e Istologia Patologica, Univ. Turin, Turin, Italy). *J. Histochem. Cytochem.* 25(10):1111-1118; 1977.

Specific immunocytochemical and light and electron microscopic methods were used to identify the somatostatin-containing cells of the human antral mucosa. By means of immunoperoxidase and immunofluorescence methods sequentially applied on the same section, the somatostatin cells were shown to be distinct from the gastrin cell population; these two endocrine cell types were often closely related. On ultrathin sections from aldehyde-fixed, Epon-araldite embedded tissues, the site of storage of somatostatin was localized with the peroxidase-antiperoxidase complexes technique after removal of the resin by means of sodium ethoxide. This procedure represents a new technical approach to the use of electron-cytochemical techniques. The results indicate that somatostatin is localized in the endocrine granules of the D cells.

1699 SUBSEGMENTATION OF THE HUMAN LIVER.

(Eng.) Gupta, S. C.; Gupta, C. D.; Arora, A. K. (Dept. Anatomy, S.N. Medical Coll., Agra, India). *J. Anat.* 124(2):413-423; 1977.

The normal topographical arrangement of human hepatic subsegments, with special reference to abnormal variations, was examined in 85 livers obtained within 24 hr of death from subjects of all ages. Colored corrosion casts of the portal vein, hepatic duct, and hepatic artery were prepared with applications of colored 18% butyl butyrate solution in acetone. Hepatic subsegments were identified by the independence of their vessels and ducts from those of neighboring territories. The following hepatic subsegments were distinguished: (1) posterior, (2) posterior inferior, (3) anterior superior, (4) anterior inferior, (5) medial superior, (6) medial inferior, (7) lateral superior, (8) lateral inferior, and (9) caudate. The sizes of the subsegments were very similar in 41 cases (48.2%). In the others, some increase or decrease in size of one or more subsegments at the expense of the neighboring subsegments was observed. Resection of a portion of the liver should not be performed without previous identification of hepatic subsegments by cholangiography or portovenography.

1700 MORPHOLOGICAL EXAMINATION OF ESOPHAGUS STOMACH AND ESOPHAGUS INTESTINE ANASTOMOSES FOLLOWING PREOPERATIVE RADIATION THERAPY.

(Ger.) Izabekov, Z. B.; Kolyceva, N. I.; Chan, S. V.; *et al.* (Kazakhstan Scientific Res. Inst. Oncology, Radiology, Alma Ata, USSR). *Radiobiol. Radiother. (Berl.)* 17(2):305-312; 1976.

1701 THE EVOLUTION OF MUCOSAL CHANGES IN EXPERIMENTAL GASTROESOPHAGEAL REFLUX ON HISTOPATHOLOGY AND SURFACE MICROSCOPY [Abstract].

(Eng.) Schulze, K.; Mitros, F.; Christensen, J.; Shirazi, S.; Ackerman, L. (Coll. Medicine, Univ. Iowa, Iowa City, IA 52242). *Clin. Res.* 25(4):574A; 1977.

1702 STRUCTURE AND FUNCTION OF THE MOUSE SMALL INTESTINE AFTER INFECTION WITH Schistosoma mansoni [Abstract].

(Eng.) Vengesa, P. B.; Leese, H. J. (Dept. Biology, Univ. York, York, England). *Gut* 18(11):A965-A966; 1977.

1703 ENDOSCOPIC OBSERVATION OF THE GASTRIC MUCUS IN VIVO STAINED WITH AZURE A.

(Eng.) Kamada, T.; Hiramatsu, K.; Fusamoto, H.; *et al.* (Osaka Univ. Medical Sch., Osaka, Japan). *Am. J. Gastroenterol.* 65(6):532-538; 1976.

See also, 1724, 1767, 1790, 1795, 1797, 1798, 1803, 1816, 1818, 1879, 1924, 1927, 1931, 1966, 1972, 1973, 1985, 1989, 2213, 2217, 2229, 2239, 2345, 2570, 2571, 2600, 2617.

1704 PARACELLULAR PERMEABILITY OF EXTRACELLULAR SPACE MARKERS ACROSS RAT JEJUNUM IN VITRO. INDICATION OF A TRANSEPITHELIAL FLUID CIRCUIT.

(Eng.) Munck, B. G.; Rasmussen, S. N. (Inst. Medical Physiology A, Univ. Copenhagen, Copenhagen, Denmark). *J. Physiol. (Lond.)* 271(2):473-488; 1977.

The characteristics of [^{51}Cr]EDTA, [^{3}H]methoxyinulin ([^{3}H]MI), [^{14}C]polyethylene glycol-4000 ([^{14}C]PEG), and [^{3}H]mannitol as markers of the extracellular space (ECS) of isolated mucosa from the rat small intestine were examined. Unidirectional transmural fluxes across the rat jejunum of [^{3}H]MI, [^{14}C]PEG, and [^{3}H]mannitol were measured in the absence of glucose or in the presence of 28 mM glucose. Assuming that [^{14}C]PEG does not enter the cells, [^{51}Cr]EDTA and [^{3}H]mannitol seemed to have access to approximately 50% and 90% of the intracellular water, resp. The commercially available [^{3}H]MI had access to a space that exceeded the [^{14}C]PEG space by 10%. Upon purification by gel filtration, the high molecular weight fraction of the [^{3}H]MI provided estimates of the ECS identical with the estimates obtained with [^{14}C]PEG. For all the markers used, the ECS estimates remained constant between the 40th and 80th min of incubation. In the absence of glucose, the transepithelial net fluxes of each of the different markers were zero. In the presence of 28 mM glucose, the serosa-to-mucosa fluxes of all markers were dramatically increased. The ratio between the serosa-to-mucosa and the mucosa-to-serosa fluxes increased in the order [^{3}H]mannitol>[^{3}H]MI>[^{14}C]PEG. The effect of glucose on the flux ratio of the marker substances suggests that glucose-induced net water transport to the serosal side of the gut wall represents the difference between a transcellular net water transport to the serosal side and a significant paracellular net water transport through the lateral intercellular spaces to the mucosal solution.

1705 THE IMPORTANCE OF THE INTESTINAL COUNTERCURRENT EXCHANGER FOR ^{85}Kr ABSORPTION FROM THE FELINE GUT.

(Eng.) Jodal, M.; Svanik, J.; Lundgren, O. (Dept. Physiology, Univ. Goteborg, Goteborg, Sweden). *Acta Physiol. Scand.* 100(4):412-423; 1977.

The relationships between intestinal absorption rate and blood flow and between absorption rate and intraluminal pressure were studied in cats. The rate of ^{85}Kr absorption from the gut was studied at varying intestinal blood flows induced by intra-arterial infusions of a vasodilator drug or by lowering arterial inflow pressure. The effects on rate of absorption of distending the intestine by increasing intraluminal pressure from 0-1 to 5-7 cm H_2O as well as of augmenting the rate of luminal perfusion of the ^{85}Kr solution were also investigated. Distending the small bowel increased rate of ^{85}Kr absorption at all levels of intestinal blood flow except at the very low and the very high blood flow rates. Decreasing blood flow by lowering the arterial perfusion pressure decreased the rate of absorption from the distended gut while it had no effect in the collapsed small intestine. Increasing the rate of luminal perfusion enhanced the rate of ^{85}Kr absorption at all blood flow levels except at the lowest ones. It is concluded that the countercurrent exchanger represents, under physiological conditions, the major limiting factor for the absorption of lipophilic solutes such as ^{85}Kr.

1706 THE ROLE OF ACETYLCHOLINE IN THE REGULATION OF ION TRANSPORT BY RAT COLON MUCOSA.

(Eng.) Browning, J. G.; Hardcastle, J.; Hardcastle, P. T.; Sanford, P. A. (Dept. Physiology, Univ. Sheffield, Sheffield, England). *J. Physiol. (Lond.)* 272(3): 737-754; 1977.

The possibility that colonic ion transport mechanisms might be under cholinergic control was investigated by determining the effect of acetylcholine on the transport activity of the rat colon. Acetylcholine (3 µg i.v. *in vivo*; 25 mM *in vitro*) increased the potential difference across rat proximal colon. There was a sigmoid relationship between the change in potential difference and the logarithm of the dose of acetylcholine. The dose-response curve was shifted to the left *in vivo* by neostigmine (10 µg) and to the right by atropine (2 µg), suggesting that the action of acetylcholine is mediated by a muscarinic type of receptor. The dose-response curve for acetylcholine *in vivo* was not altered by the ganglion-blocking agents hexamethonium (100 µg) and pentolinium (25 µg), suggesting a direct effect of this transmitter on the colon. Acetylcholine caused an increase in potential difference, a small decrease in resistance, and, hence, a rise in the current generated by both normal and stripped everted sacs of rat colon. In the absence of sodium, the calculated current change produced by acetylcholine was reduced, and the removal of chloride had a similar inhibitory effect. The absence of bicarbonate did not significantly affect the response. Acetylcholine virtually abolished net sodium movement and induced net chloride secretion, and these changes accounted for the increased short-circuit current. Acetylcholine had no effect on oxygen consumption by rings of colon. Tracts staining for acetylcholinesterase were observed running from the submucous plexus towards the mucosal epithelium. The results demonstrate that acetylcholine can influence ion movement by rat colonic mucosa and suggest that the autonomic nervous system might be involved in the regulation of transport mechanisms in this tissue.

1707 THE EFFECT OF ETHANOL AND BILE ON ELECTROLYTE MOVEMENT ACROSS CANINE PROXIMAL DUODENAL MUCOSA.

(Eng.) Himal, H. S.; Greenberg, L. (Royal Victoria Hosp., 687 Pine Ave. W., Montreal, Quebec H3A 1A1, Canada). *Am. J. Gastroenterol.* 68(1):45-50; 1977.

The effect of ethanol and bile on electrolyte movement across the duodenal mucosa was examined in 10 dogs. Duodenal explants from the dogs with an intact blood supply were placed within lucite chambers. Under basal conditions there was H$^+$ insorption and Na$^+$ exsorption. Neither bile nor ethanol (20%) caused increased the H$^+$ Na$^+$ flux. Acute erosions did not develop in the proximal duodenum, as has been previously shown to occur when bile or ethanol is instilled into the stomach. These studies demonstrate that although H$^+$ Na$^+$ flux occurs across the duodenal mucosa, bile or ethanol do not cause changes in ionic flux and acute erosions do not develop.

1708 ALTERATION OF LARGE INTESTINAL ELECTROLYTE TRANSPORT BY VASOACTIVE INTESTINAL POLYPEPTIDE IN THE RAT. (Eng.) Racusen, L. C.; Binder, H. J. (Dept. Internal Medicine, Yale Univ., 333 Cedar St., New Haven, CT 06510). *Gastroenterology* 73(4, Part 1):790-796; 1977.

The effect of vasoactive intestinal polypeptide (VIP) on Na and Cl transport across isolated large intestinal epithelia under short-circuited conditions was evaluated in the rat, since some evidence suggests that this intestinal hormone may not affect colonic ion transport. An increase in short-circuit current and potential difference was produced by the addition of VIP to the serosal media at concentrations as low as 10^{-9} M, and maximal increments were observed at 10^{-7} M. In control mucosa, the net sodium flux was 4.93 ± 0.52 μEq/hr/cm^2. The addition of VIP (6 x 10^{-7} M) resulted in a decrease in net sodium flux (0.87 ± 0.46 μEq/hr/cm^2), a reversal of Cl absorption to Cl secretion (-2.42 ± 1.12 μEq/hr/cm^2), and an increase in short-circuit current. Unidirectional mucosal to serosal fluxes of both Na and Cl decreased. The changes produced by VIP were identical with those induced by 10 mM theophylline. The effect of VIP plus theophylline on the net sodium flux and short-circuit current were indistinguishable from those of VIP alone and theophylline alone. VIP also increased mucosal cyclic AMP content. These studies indicate that VIP alters large intestinal ion transport; these changes are most likely mediated by increased mucosal levels of cyclic AMP.

1709 ADENOSINE UPTAKE BY THE ISOLATED EPITHELIUM OF GUINEA PIG JEJUNUM. (Eng.) Kolassa, N.; Stengg, R.; Turnheim, K. (Pharmakologisches Institut, Universitat Wien, Wahringerstr. 13A, A-1090 Vienna, Austria). *Can. J. Physiol. Pharmacol.* 55(5):1033-1038; 1977.

The respective roles of passive diffusion and of carrier-mediated transfer in the uptake of adenosine by the intestinal epithelium were studied in the isolated guinea pig jejunal epithelium. The uptake of [8-^{14}C]adenosine was faster than that of inosine, hypoxanthine, or adenine. The initial velocity of adenosine uptake from both the luminal and the antiluminal side of the epithelium exhibited saturation kinetics. The apparent K_m, V, and passive permeability of luminal adenosine uptake were all lower than the corresponding values of antiluminal uptake. *p*-Nitrobenzylthioguanosine inhibited adenosine uptake from both the luminal and the antiluminal side, while hexobendine decreased the uptake only from the antiluminal side of the epithelium. The results suggest that adenosine enters the intestinal epithelium by a carrier-mediated process in addition to that of passive diffusion. The antiluminal transport system for adenosine seems similar to that of other tissues with respect to hexobendine inhibition; the luminal transport mechanism, however, exhibits different properties, being insensitive to hexobendine.

1710 AMINO ACID ABSORPTION ALONG THE INTESTINAL TRACT OF CHICKS FED HEATED AND RAW SOYBEAN MEAL. (Eng.) Bielorai, R.; Tamir, M.; Hurwitz, S. (Inst. Animal Sciences, Agricultural Res. Organization, Volcani Center, Bet Dagan, Israel). *J. Nutr.* 107(10):1775-1778; 1977.

Net absorption of individual amino acids along the intestinal tract was determined in chicks fed heated soybean meal (HS) and raw soybean meal (RS), using ^{91}Y as a reference substance. In the duodenum of chicks fed either diet, the absorption of the amino acids varied. In chicks fed the RS diet, the differences were greater than in chicks fed the HS diet, and most of the values were negative. Methionine was the most rapidly and extensively (82%) absorbed amino acid. No cystine was found in the upper parts of the intestinal tract of chicks fed either diet. A linear relationship was obtained between the amino acid absorption values in the duodenum of chicks fed either diet. The differences may be due to nitrogen secretion, which is known to be enhanced in RS-fed chicks. The differences between individual amino acid absorption decreased gradually in the other segments and attained in the lower ileum an average cumulative value of 90% and 70% in chicks fed on HS and RS, resp. The 20% difference is probably a result of the inhibited digestion in the intestine (duodenum excluded) of chicks fed RS. The results indicate that absorption can proceed even when digestion is inhibited.

1711 A REAPPRAISAL OF 'OSMOTIC' EVIDENCE FOR INTACT PEPTIDE ABSORPTION. (Eng.) Fairclough, P. D.; Silk, D. B.; Webb, J. P. W.; Clark, M. L.; Dawson, A. M. (St. Bartholomew's Hosp., London EC1A 7BA, England). *Clin. Sci. Mol. Med.* 53(3):241-248; 1977.

The validity of evidence for intact peptide absorption, derived from analysis of the relation of water and total solute absorption, was tested in the normal human jejunum. Jejunal solute and water absorption from saline solutions of the disaccharide maltose was studied by a double-lumen perfusion technique with a proximal occlusive balloon. It was expected that maltose would yield very different results from peptides, but this expectation was not confirmed by this experiment. The assumption that the absorbate is always isotonic with plasma was tested by altering the osmolality of glucose/saline solutions perfused in the jejunal lumen. This assumption was not substantiated by experiment, when the luminal fluid was hypertonic to plasma, so was the absorbate. The findings with peptides and disaccharides may be explained as the production of a hypertonic absorbate by hydrolysis of these solutes to their monomer units. It is therefore concluded that analyses of the relation of net solute and water absorption cannot be used to predict the form in which peptides enter the mucosal cells.

1712 THE NUMBER OF GLYCINE RESIDUES WHICH LIMITS INTACT ABSORPTION OF GLYCINE OLIGOPEPTIDES IN HUMAN JEJUNUM. (Eng.) Adibi, S. A.; Morse, E. L. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15213). *J. Clin. Invest.* 60(5):1008-1016; 1977.

Studies were carried out in 28 healthy subjects to determine whether glycine peptides of four or more glycine residues can be transported by the peptide carrier system, previously shown to transport diglycine and triglycine. When the jejunum was perfused with tetraglycine solutions, the rate of tetraglycine disappearance increased linearly as the concentration was increased over the range of 12.5-50 mM; however, the rate was slow in comparison to diglycine and triglycine disappearance rates. Glycylleucine, a competitive inhibitor of diglycine and triglycine transport, was without effect on the disappearance rate of tetraglycine, but increased the appearance rates of triglycine and diglycine by over sixfold. These products were the results of hydrolysis of tetraglycine by the brush border enzymes, because the cytosol fraction lacked any hydrolase activity against tetraglycine. When a jejunal ring preparation from Sprague-Dawley rats was incubated with tetraglycine, there was intracellular accumulation of diglycine and triglycine but not of tetraglycine. The rates of glycine uptake were always markedly greater from diglycine and triglycine solutions than from corresponding glycine or tetraglycine solutions; rates of glycine uptake from tetraglycine solutions were either similar to or greater than rates from glycine solutions, depending on the infusion concentration. When the number of glycine residues was increased to hexaglycine, the phenomenon of a greater rate of glycine uptake from a peptide versus a free amino acid solution was no longer apparent. *In vitro* assay of peptide hydrolase activity of the luminal fluid revealed no activity against diglycine and triglycine and only trace activities against tetraglycine, pentaglycine, and hexaglycine. The observations suggest that (a) the disappearance of tetraglycine in the human jejunum is accomplished principally via hydrolysis by brush border oligopeptidases, and (b) the rate limiting step in the uptake of glycine from tetraglycine or higher peptides is due to hydrolysis of these peptides to absorbable products.

1713 IONIC FLUX ACROSS CANINE DUODENUM: MOVEMENT OF BICARBONATE. (Eng.) Himal, H. S.; Rudick, J. (Royal Victoria Hosp., 687 Pine Ave. W., Montreal, Quebec H3A 1A1, Canada). *Am. J. Gastroenterol.* 67(6):574-579; 1977.

The effect of isosmotic biocarbonate-rich solutions on the Brunner's gland area were studied in proximal duodenal explants in eight anesthetized dogs. Volume gain occurred with all instillates and varied indirectly with the concentration of the bicarbonate in the instilled solutions. Net bicarbonate gain occurred with instillate of 40 mEq/l; net insorption occurred with instillates of higher bicarbonate concentration (40-80 mEq/l), the rate of which was dependent on the instillate concentration. Insorption of chloride occurred with the less concentrated bicarbonate solutions (40-80 mEq/l), and enterosorption occurred at higher concentrations (80-120 mEq/l). The modification of intraluminal bicarbonate by the proximal duodenal mucosa is important in the regulation of intraduodenal pH. The abnormal function of this mechanism may play a role in the pathogenesis of duodenal ulceration because of incomplete hydrochloric acid neutralization.

1714 ROLE OF PANCREATIC CHOLESTEROL ESTERASE IN THE UPTAKE AND ESTERIFICATION OF CHOLESTEROL BY ISOLATED INTESTINAL CELLS. (Eng.) Gallo, L. L.; Newbill, T.; Hyun, J.; Vahouny, G. V.; Treadwell, C. R. (George Washington Univ. Sch. Medicine and Health Sciences, Washington, DC 20037). *Proc. Soc. Exp. Biol. Med.* 156(2):277-281; 1977.

To determine if the component in pancreatic juice that is essential for cholesterol absorption is pancreatic cholesterol ester hydrolase (CEH) and to investigate whether cholesterol uptake by the intestinal cell is independent of CEH, isolated intestinal mucosal cells from normal and common duct-cannulated rats were prepared by collagenase dissociation. These cells displayed ultrastructural integrity and retained several metabolic characteristics typical of intact intestinal mucosa. These characteristics included galactose accumulation and its inhibition by dinitrophenol, glucose oxidation, incorporation of labeled leucine into cellular protein, and the uptake and esterification of fatty acid. Cholesterol uptake by cells from common duct-cannulated rats was comparable to that in cells from control animals; however, esterification was only about 25% of that in control cells. Preincubation of the "defective" cells for 30 min with the purified subunit or active form of pancreatic sterol ester hydrolase had no effect on cholesterol uptake but resulted in a fourfold to sixfold increase in the ability of the cells to esterify cholesterol. These studies provide additional evidence for the essential role of pancreatic sterol ester hydrolase in the mucosal esterification of absorbed cholesterol prior to lymphatic transport.

1715 ABSORPTION, PLASMA TRANSPORT, AND CELLULAR RETENTION OF COBALAMIN ANALOGUES IN THE RABBIT: EVIDENCE FOR THE EXISTENCE OF MULTIPLE MECHANISMS THAT PREVENT THE ABSORPTION AND TISSUE DISSEMINATION OF NATURALLY OCCURRING COBALAMIN ANALOGUES. (Eng.) Kolhouse, J. F.; Allen, R. H. (Univ. Colorado

Medical Center, Denver, CO 80220). *J. Clin. Invest.* 60(6):1381-1392; 1977.

Cobalamin (Cbl) analogues containing ^{57}Co and ^{58}Co were synthesized, and their gastrointestinal absorption, plasma transport, and cellular retention in rabbits were compared with those of [^{58}Co]Cbl. Many of the Cbl analogues were bound with low affinity by intrinsic factor, and none of the [^{57}Co]-Cbl analogues were taken up by the ileum or absorbed into the body in amounts comparable to that of [^{58}Co]Cbl. The analogues that were bound by intrinsic factor with high affinity were taken up by the ileum but, in many cases, they were retained there in significant amounts. Most analogues were bound by plasma transcobalamin II with high affinity, and all of these transcobalamin II-[^{57}Co]-Cbl analogue complexes were taken up by a variety of tissues in a manner that was indistinguishable from that of transcobalamin II-[^{58}Co]Cbl. The few analogues that were bound by transcobalamin II with low affinity were taken up by tissues in lesser amounts, and 20-70% of these analogues was rapidly excreted in the urine. All Cbl analogues were bound by the granulocyte R-type Cbl-binding protein with high affinity, and all of the R-type protein-[^{57}Co]-Cbl analogue complexes were cleared rapidly from plasma exclusively by hepatocytes, as occurred with R-type protein-[^{58}Co]Cbl. Some Cbl analogues were released back into the plasma and were disseminated among a variety of tissues via transcobalamin II as occurred with native Cbl. Other Cbl analogues were retained in the liver and eventually excreted in the feces and urine without accumulating in other tissues. These studies indicate that intrinsic factor and the ileum prevent certain Cbl analogues from entering the body and that the granulocyte R-type protein and hepatocytes prevent the dissemination of certain Cbl analogues that may gain entry such as during infections with Cbl analogue-producing bacteria. The fact that transcobalamin II binds and transports a large number of Cbl analogues indicates that these protective mechanisms can be circumvented and supports the feasibility of using Cbl analogues as antimetabolites *in vivo*.

1716 ENERGETICS OF Na^{+}-DEPENDENT SUGAR TRANSPORT BY ISOLATED INTESTINAL CELLS: EVIDENCE FOR A MAJOR ROLE FOR MEMBRANE POTENTIALS.

(Eng.) Kimmich, G. A.; Carter-Su, C.; Randles, J. (Univ. Rochester Medical Center, Rochester, NY 14642). *Am. J. Physiol.* 233(5):E357-E362; 1977.

The mechanics of Na^{+}-dependent sugar transport by isolated intestinal cells were studied. Intestinal epithelial cells isolated from 6-week-old chickens maintained the capability for Na^{+}-dependent concentrative accumulation of 3-*O*-methylglucose (3-OMG). Cells depleted of ATP exhibited a transient accumulation of 3-OMG in response to imposed Na^{+} gradients or when transmembrane ion diffusion potentials (cell interior negative) were established. Phlorizin or lack of extracellular Na^{+} prevented the formation of sugar gradients in every case. A nonconcentrative, non-Na^{+}-dependent sugar transport system was also operative in these cells. The latter system was inhibited to various degrees by phloretin, theophylline, cytochalasin B, and a variety of flavonones and flavones, including apigenin. These agents also inhibited sugar efflux from the cell via this pathway. The concentrative system normally operates against a "leak" of sugar through the nonconcentrative carrier. If the passive system was made inoperative by any of the agents named above, a significant enhancement of steady-state sugar gradients maintained by the cells was observed. With cytochalasin B, gradients as large as 30-fold were established. The energy inherent in cellular Na^{+} gradients could not account for sugar gradients of this magnitude unless both chemical and electrical driving forces were considered. When the passive leak was maximally inhibited, more than half of the total energy required had to be derived from the membrane potential.

1717 UNSTIRRED LAYER AND KINETICS OF ELECTROGENIC GLUCOSE ABSORPTION IN THE HUMAN JEJUNUM IN SITU.

(Eng.) Read, N. W.; Barber, D. C.; Levin, R. J.; Holdsworth, C. D. (Royal Infirmary, Sheffield, England). *Gut* 18(11):865-876; 1977.

Using an electrical technique, the thickness of the unstirred layer in the human jejunum was estimated during kinetic studies of electrogenic glucose absorption to determine whether differences in the thickness of the unstirred layer could explain the low apparent K_m and maximum potential difference (PDmax) for the active electrogenic component of glucose absorption in untreated celiac disease. The unstirred layer in 7 healthy volunteers (632 ± 24 μM) was significantly thicker than in 10 patients with active celiac disease (442 ± 23 μm) but not significantly different in 7 patients who had responded to treatment by gluten withdrawal (585 ± 49 μm). There were similar differences in the values of apparent K_m for electrogenic glucose absorption between healthy controls (36 ± 6 mM), active celiac patients (11 ± 1 mM), and treated celiac patients (31 ± 5 mM). The changes in PDmax, however, showed a different pattern. The PDmax in the active celiac group (6.8 ± 0.7 mV) was lower than in controls (7.6 ± 0.6 mV) but not significantly so, while the PDmax in the treated celiac group (10.6 ± 0.9 mV) was significantly higher than in both the active celiac and control groups. Analysis of the results using a computer simulation indicated that the reduction in apparent K_m in active celiac disease can be caused by the interaction of the decreased maximal absorption rate for glucose with the attenuated unstirred layer. In these circumstances it is not necessary to postulate any change in the affinity of the transport mechanism for glucose ("real K_m").

1718 LACTOSE AND PROTEIN ABSORPTION FROM BREAST MILK AND COW'S MILK PREPARATIONS AND ITS INFLUENCE ON THE INTESTINAL FLORA: INVESTIGATIONS ON TWO INFANTS WITH AN ARTIFICIAL ANUS.

(Eng.) Heine, W.; Zunft, H. J.; Muller-Beuthow, W.; Grutte,

F. K. (Dept. Pediatrics, Wilhelm-Pieck-Univ., 25 Rostock, E. Germany). *Acta Paediatr. Scand.* 66(6): 699-703; 1977.

Lactose and nitrogen balance studies were carried out in two 4-month-old infants with an artificial anus, who were fed either breast milk or a cow's milk preparation, to determine whether the lactose in human breast milk is absorbed less well than the lactose in cow's milk. The concentrations of protein, lactose, glucose, and galactose were measured in the fistula stools, and the fecal bacteria were identified and quantitated. There were relatively high concentrations of lactose and its decomposition products and low concentrations of protein and amino nitrogen in the fistula stools when breast milk was fed. When the cow's milk formula was fed, only traces of lactose but high amounts of protein were present. Higher total intestinal bacteria counts were found in the stools of the infant fed the cow's milk formula. These results support the hypothesis that the lactose from breast milk is not absorbed as well as that in cow's milk. They also indicate that the bacterial flora of the large intestine is influenced by lactose and protein concentrations.

1719 STUDIES OF TRANSLOCATION OF IMMUNOGLOBULINS ACROSS INTESTINAL EPITHELIUM. IV. EVIDENCE FOR BINDING IgA AND IgM TO SECRETORY COMPONENT IN INTESTINAL EPITHELIUM.

(Eng.) Brown, W. R.; Isobe, K.; Nakane, P. K.; Pacini, B. (Veterans Admin. Hosp., 1055 Clermont St., Denver, CO 80220). *Gastroenterology* 73(6):1333-1339; 1977.

Studies were carried out to determine whether secretory component (SC) is a specific receptor on intestinal epithelial cells for IgA and IgM. Initially, frozen sections of human intestinal mucosa were incubated with dimeric monoclonal human IgA_1 conjugated to horseradish peroxidase; adjacent sections were reacted with peroxidase-conjugated antibodies to SC. The conjugated IgA and anti-SC bound to similar sites in the epithelium, that is to basolateral margins and supranuclear cytoplasm of columnar epithelial cells, principally in gland crypts. Binding of the dimeric IgA conjugate was inhibited by pretreating the tissues with unconjugated dimeric IgA or 19S IgM, pretreating the tissues with unconjugated antibodies to SC, or preincubating the dimeric IgA conjugate with free SC. Binding was not inhibited or only partially inhibited by pretreating the tissues with monomeric IgA or IgG, pretreating the tissues with antibodies to human or heterologous immunoglobulins, or preincubating the dimeric IgA conjugate with 11S secretory colostral IgA. The findings indicate that dimeric IgA and 19S IgM are capable of binding *in vitro* to specific sites on intestinal epithelial cells, most likely to SC. This supports the hypothesis that transport of these immunoglobulins into intestinal fluids involves their combination with SC in the epithelium.

1720 ABSORPTION OF HORSERADISH PEROXIDASE BY THE PRINCIPAL CELLS OF THE LARGE INTESTINES OF POSTNATAL DEVELOPING RATS.

(Eng.) Ono, K. (Iwate Medical Univ., Morioka, Japan). *Anat. Embryol.* 151(1):53-62; 1977.

The absorption of horseradish peroxidase in the rat large intestine during postnatal development was investigated by cytochemical and ultrastructural methods. In the ceca and ascending colons from 4-, and 5-day-old rats, intraluminaly injected peroxidase (20 mg/ml) became localized on microvilli, in the intracytoplasmic network of the apical tubules and small vacuoles (tubulo-vacuolar system), in the large supranuclear vacuole, in the Golgi apparatus, on the lateral and basal cell membranes of the surface principal cells, and also in the lumen of blood capillaries in the subjacent propria.
The protein tracer was not seen in the large intestinal epithelial cells that lack tubulo-vacuolar systems and large supranuclear vacuoles within their cytoplasm. In the descending colons of rats of any postnatal age (0-25 days, and adults), the epithelial principal cells were devoid of these membrane systems, and exogenous peroxidase was not detected in the cytoplasm of the principal cells. The results suggest that at least the proximal portion of the large intestine in neonatal animals has the capacity to absorb macromolecular protein through those surface principal cells that have specialized intracellular membrane systems.

1721 LACK OF EFFECT OF VITAMIN D AND ITS METABOLITES ON INTESTINAL PHOSPHATE TRANSPORT IN FAMILIAL HYPOPHOSPHATEMIA OF MICE.

(Eng.) O'Doherty, P. J. A.; DeLuca, H. F.; Eicher, E. M. (Coll. Agricultural and Life Sciences, Univ. Wisconsin, Madison, WI 53706). *Endocrinology* 101(4): 1325-1330; 1977.

Intestinal calcium and phosphate transport was studied in normal and hypophosphatemic mice fed vitamin D-deficient or -supplemented diets, or phosphorus-deficient or -supplemented diets. Regardless of dietary phosphorus levels (low phosphorus, 0.1% or normal phosphorus, 0.3%), the genetic hypophosphatemic mice had drastically reduced levels of serum inorganic phosphate and intestinal phosphate transport while showing only slightly reduced serum calcium and intestinal calcium transport levels. The inclusion of vitamin D (250 ng/day) in the diet did not increase the low serum phosphorus levels and low rates of intestinal phosphate transport in the genetic hypophosphatemic mice, while it did increase serum calcium and intestinal calcium transport levels. The administration of 1,25-dihydroxyvitamin D_3 to the hypophosphatemic mice stimulated intestinal calcium transport but had no effect on intestinal phosphate transport. In contrast, 1,25-dihydroxyvitamin D_3 stimulated both phosphate and calcium transport in the intestine of normal mice. The results support the hypothesis that the primary metabolic disturbance in familial hypophosphatemia involves a defect in phosphate transport mechanisms.

1722 MECHANISM OF INTESTINAL ABSORPTION OF THIAMINE. (Eng.) de Angelis, R. C. (Caixa Postal, 4365, 01000 Sao Paulo, Brazil). *Arq. Gastroenterol.* 14(3):135-143; 1977.

The mechanism of thiamine absorption from the intestinal lumen was studied in mice, hamsters, and rats. *In vitro* experiments were performed using the everted sac technique in the small intestine of mice and hamsters. *In vivo* perfusion of rat small intestine was performed in anesthetized animals. Glucose and the volume of extracellular compartments were also estimated. In *in vitro* studies, when thiamine concentrations in the incubation fluid were up to 0.2 μg/ml, its final concentration in the mucosa was higher than that in the incubation medium. At concentrations above 5 μl/ml, the accumulation of both thiamine and glucose in the mucosa was inhibited by 2-4-dinitrophenol (DNP) or sodium fluoride (NaF) in concentrations over 1×10^{-5} M. At low concentrations (0.05 μg/ml), thiamine entered the epithelial cells by means of active transport mechanism, and the presence of sodium was required. In the presence of metabolic inhibitors (DNP, NaF) or when sodium was replaced by lithium, thiamine passed into the mucosa by diffusion. At thiamine concentrations above 20 μg/ml, its transport was enhanced by DNP, NaF, or anoxia. The rate of transport was inversely related to differences of the potentials generated across the mucosal cells.

1723 EFFECT OF ETHANOL ON INTESTINAL (Na, K) ATPase AND INTESTINAL THIAMINE TRANSPORT IN RATS. (Eng.) Hoyumpa, A. M., Jr.; Nichols, S. G.; Wilson, F. A.; Schenker, S. (Veterans Admin. Hosp., Nashville, TN 37203). *J. Lab. Clin. Med.* 90(6):1086-1095; 1977.

Since previous studies suggested that ethanol may impair thiamine transport by inhibiting serosal (Na, K)-ATPase activity, the effect of ethanol on this enzyme was investigated. (Na, K) ATPase was assayed in the brush border membrane and basolateral membrane (BLM) fractions of rat intestinal mucosal cells. In the jejunum, BLM (Na, K)-ATPase activity was 13-fold greater than in the corresponding brush border preparation. Ethanol (0.5 M), added *in vitro* to the BLM preparation, reduced (Na, K)-ATPase activity in the jejunum to 41% ($p<0.001$) of control. *In vitro* ethanol (0.1 M, 0.2 M, 0.3 M, 0.5 M, 0.7 M, and 1.0 M) decreased jejunal BLM (Na, K)-ATPase activities to 94%, 78%, 58%, 41%, 28%, and 17% of control value (for all but 94%, $p<0.001$), resp. In addition, 1 hr after the p.o. administration of 50, 100, 250, 500, and 750 mg/100 g ethanol, ATPase activity declined to 73%, 52%, 52%, 62%, and 48% of control, resp. (for all, $p<0.01$). The same doses of ethanol decreased the serosal appearance rate of 0.5 μM thiamine to 82%, 48%, 50%, 51%, and 51% of control, resp. (for all but 82%, $p<0.05$). These data clearly show an association between ethanol inhibition of BLM (Na, K) ATPase and decreased thiamine transport, but whether this association is one of cause and effect requires further study.

1724 LIMITED FAT ABSORPTION IN THE LARGE INTESTINE OF MICE: A MORPHOLOGICAL STUDY. (Eng.) Snipes, R. L. (Zentrum fur Anatomie und Zytobiologie der Justus-Liebig-Universitat, Aulweg 123, D-6300 Giessen, W. Germany). *Acta Anat. (Basel* 99(4):435-439; 1977.

Fat absorption and mucosal morphology were studied in the cecum and colon of mice after force-feeding fat and after the injection of predigested donor fat into ligated segments of the large intestine. Both the feeding of corn oil (0.5-1.0 ml for 3 hr at 3 times daily for 2-3 days) and the injection of fat led to the appearance of fat droplets in the epithelial cells of the large intestine; the number of fat droplets in these animals was significantly greater than that in controls. Electron microscopy revealed that large droplets were present in the supra- and infranuclear areas after the exposure to fat. Initial sequestration in the smooth endoplasmic reticulum was not apparent, as it is in the small intestine. After longer absorption times, fat was seen to accumulate in the large intestinal epithelial cells. The accumulation was mostly in the form of increasing droplet size. The observations suggest that the entry of fat into segments of the colon and cecum occurs by simple diffusion. The accumulation of large fat droplets indicates that the ability of the cells to process the fat efficiently for its transport out of the cells is reduced in comparison with that in the proximal small intestine.

1725 ROLE OF BILIARY LECITHIN IN LYMPHATIC TRANSPORT OF FAT. (Eng.) Tso, P.; Balint, J. A.; Simmonds, W. J. (Dept. Physiology, Univ. Western Australia, Nedlands 6009, Western Australia). *Gastroenterology* 73(6):1362-1367; 1977

The role of luminal lecithin in the lymphatic transport of fat as chylomicrons was assessed in male Wistar rats. Two doses of fat (low and high) were fed to control and bile fistula rats. The infusion of a low dose of a mixture of oleic acid and monoolein (35 μmol/hr total fatty acid, molar ratio of 2:1, solubilized in 55 μmol of sodium taur cholate) produced no difference in the lymphatic output of absorbed fat during steady-state (7th and 8th hr) absorption. Infusing a high dose (173 μmol/hr) of a mixture of oleic acid and monoolein produced a lower triglyceride and phospholipid output in bile fistula rats with a higher proportion of oleic acid in lymph lecithin than in control rats. The alterations in bile fistula rats returne to normal following the addition of biliary lecithi (10 μmol/hr) to the infusate. It is concluded that intraluminal biliary lecithin plays a significant role in the translocation of high doses of absorbed fat into lymph and in the amount and type of lecithin synthesized.

1726 ABSORPTION OF PARTIALLY HYDROGENATED SOY OIL BY INFANTS. (Eng.) Klein, G. L.;

MacLean, W. C., Jr.; Lopez de Romana, G.; Massa, E.; Graham, G. G. (615 North Wolfe St., Baltimore, MD 21205). *Nutr. Rep. Int.* 16(4):447-553; 1977.

Apparent absorption of partially hydrogenated soy oil was compared with that of nonhydrogenated soy oil in two groups of infants: five previously malnourished boys, 7-22 months old, and six normal boys, 4-14 months old. Fecal fat excretion while consuming nonhydrogenated soy oil (7.2 ± 2.3 g/day, 14.4 ± 5.5% of intake) was not significantly greater than that while consuming partially hydrogenated soy oil (6.1 ± 2.3 g/day, 12.0 ± 4.6% of intake). Nitrogen balance was similar with both diets. There seems to be no contraindication to the use of the more stable partially hydrogenated form of the oil in formulas intended for infants over 4 months old; however, these studies do not include infants in the immediate neonatal period.

1727 PHARMACEUTICAL APPROACH TO THE ORAL DOSAGE FORM OF MACROMOLECULES: EFFECT OF BILE SALTS AND OIL-IN-WATER EMULSIONS ON THE INTESTINAL ABSORPTION OF UROGASTRONE IN THE RAT. (Eng.) Hori, R.; Okumura, K.; Inui, K. I.; Nakamura, N.; Miyoshi, A.; Suyama, T. (Hiroshima Univ. Sch. Medicine, Hiroshima, Japan). *Chem. Pharm. Bull. (Tokyo)* 25(8):1974-1979; 1977.

The absorption of urogastrone, a glycoprotein with gastric antisecretory activity, from the rat intestine was studied using a technique in which the indirect assay of its appearance in the blood stream was facilitated by a concomitant lowering of gastric acid secretion. The i.v. or i.p. administration of urogastrone (0.3-0.5 mg, i.v.; 1.3-2.5 mg, i.p.) produced 40% inhibition of control levels of H^+ output. The intrajejunal administration of urogastrone (15.0-20.0 mg) produced only a slight inhibitory response. However, when urogastrone was administered intrajejunally with various bile salts or oil-in-water emulsions, a strong inhibitory response of gastric H^+ secretion was elicited. Trioctanoin emulsion was the most effective, followed by olive oil, diethyl phthalate, and liquid paraffin, resp. The results suggest that orally active dosage forms for poorly absorbable macromolecules such as urogastrone might be prepared by pharmaceutical modification.

1728 EFFECTS OF CHOLERA ENTEROTOXIN ON INTESTINAL TISSUE WATER AS MEASURED BY NUCLEAR MAGNETIC RESONANCE (NMR) SPECTROSCOPY: II. (Eng.) Udall, J. N.; Alvarez, L. A.; Chang, D. C.; Soriano, H.; Nichols, B. L.; Hazlewood, C. F. (Baylor Coll. Medicine, Houston, TX 77030). *Physiol. Chem. Phys.* 9(1):13-20; 1977.

To determine the effects of cholera enterotoxin on intestinal tissue water, an open-ended loop experiment was performed in male rats. A double ligature was placed 20 cm proximal to the cecum, and 2-4 cm^3 of saline was injected distal to the ligature. A temporary ligature was placed proximal to the cecum, and 2.0 ml of enterotoxin was injected into the closed loop. A control was injected with 2.0 ml saline. In addition, the intestinal villi were scraped, centrifuged at 2,000 revolutions per min for 10 min, and the villous specimens were evaluated for water concentration and nuclear magnetic resonance (NMR) relaxation parameters. The average luminal fluid volume for the enterotoxin-exposed animal was 1.3 ml, compared to 0.3 ml for the control ($p<0.01$). Water percentage in intestinal tissue was 80.1 ± 0.5% for the toxin-exposed and 81.9 ± 0.3% for the control ($p<0.005$). In the scraped villi experiment, the percentage of water, corrected for fat, was 80.9 ± 0.1% in the control, and 86.9 ± 0.6% in the toxin-exposed animal ($p<0.01$). The NMR relaxation times of water protons were significantly lengthened in all toxin-exposed tissue. The results confirm the hypothesis that enterotoxin increases intestinal cell water content by acting on the mucosal cells.

1729 INTERRELATIONSHIP BETWEEN MUCOSAL CELL TRANSFERRIN AND IRON ABSORPTION [Abstract]. (Eng.) Savin, M. A.; Cook, J. D. (Univ. Kansas Medical Center, Kansas City, KN). *Clin. Res.* 25(4):573A; 1977.

1730 THE ABSORPTION OF THE KETO ACID ANALOGUE OF VALINE FROM RAT SMALL INTESTINE [Abstract]. (Eng.) Weber, F. L., Jr.; Deak, S. (Veterans Admin. Hosp., Lexington, KY). *Clin. Res.* 25(4):575A; 1977.

1731 CHOLESTEROL REDUCES THE EFFECTS OF OLEIC ACID ON JEJUNAL WATER AND SOLUTE TRANSPORT [Abstract]. (Eng.) Ammon, H. V.; Broor, S. L. (Veterans Admin. Center, Wood, WI). *Clin. Res.* 25(4):569A; 1977.

1732 INTESTINAL THIAMINE TRANSPORT: EFFECT OF CHRONIC ETHANOL ADMINISTRATION IN RATS [Abstract]. (Eng.) Hoyumpa, A.; Nichols, S.; Henderson, G.; Schenker, S. (Veterans Admin. Hosp., Nashville, TN). *Clin. Res.* 25(4):571A; 1977.

1733 ROLE OF MITOCHONDRIA IN IRON TRANSPORT BY GUINEA-PIG SMALL INTESTINE [Abstract]. (Eng.) Hopkins, J.; Cox, T. M.; Peters, T. J. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(11):A961; 1977.

1734 IN VITRO UPTAKE OF IRON BY HUMAN DUODENAL BIOPSIES [Abstract]. (Eng.) Cox, T. M.; Peters, T. J. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(11):A961; 1977.

1735 EFFECT OF MALTOSE ON THE ABSORPTION OF GLUCOSE IN THE JEJUNUM IN MAN [Abstract]. (Eng.) Sandle, G. I.; Lobley, R. W.; Holmes, R. (Manchester Royal Infirmary, Manchester, England). *Gut* 18(11):A944-A945; 1977.

ABSORPTION - EXCRETION - TRANSPORT

1736 THE ROLE OF GASTRIC LIPOLYSIS ON FAT ABSORPTION AND BILE ACID METABOLISM IN THE RAT [Abstract]. (Eng.) Roy, C. C.; Lefebvre, D.; Chartrand, L. (Hopital Ste-Justine, Montreal, Quebec, Canada). *Clin. Res.* 25(5):689A; 1977.

1737 PROPIONATE TRANSPORT BY THE HUMAN COLON [Abstract]. (Eng.) Ruppin, H.; Bar-Meir, S.; Soergel, K. H.; Wood, C.; Schmitt, M. G. (Medical Coll. Wisconsin, Milwaukee, WI). *Clin. Res.* 25(4):609A; 1977.

1738 EFFECTS OF VASOACTIVE INTESTINAL PEPTIDE (VIP) ON CANINE INTESTINAL Na AND H_2O FLUXES AND BLOOD FLOW [Abstract]. (Eng.) Mailman, D. (Dept. Biology, Univ. Houston, Houston, TX 77004). *Physiologist* 20(4):60; 1977.

1739 EFFECT OF ALDOSTERONE, VASOPRESSIN, AND NATRIURETIC FACTOR ON ABSORPTION IN THE RAT JEJUNUM. (Rus.) Kosuba, R. B.; Ivanov, Yu. I. (Chernovtsy Medical Inst., Chernovtsy, USSR). *Biull. Eksp. Biol. Med.* 83(6):704-706; 1977.

1740 ASCORBIC ACID ABSORPTION IN RAT INTESTINE AND KIDNEY. (Eng.) Davis, M. G.; Murphy, P. R.; Crawshaw, S. J.; MacGladrie, K. (Sch. Natural Sciences, Hatfield Polytechnic, Hatfield, Herts AL10 9AB, England). *Nutr. Metab.* 21(Suppl. 1):266-268; 1977.

1741 INTESTINAL TRANSPORT OF UREA IN NORMAL AND UREMIC RATS. (Spa.) Robles, G.; Suarez, G. I.; Chavez-Peon, F.; Wolpert, E. (Instituto Nacional de la Nutricion, Av. San Fernando y Viaducto Tlalpan, Mexico 22, D.F.). *Rev. Invest. Clin. (Mex.)* 29(2):151-159; 1977.

1742 HUMORAL REGULATION OF VITAMIN B_{12} ABSORPTION BY PREGNANT RAT SMALL INTESTINE [Abstract]. (Eng.) Robertson, J. A.; Gallagher, N. D. (Royal Prince Alfred Hosp., Sydney, Australia). *Clin. Exp. Pharmacol. Physiol.* 4(5):481; 1977.

1743 ACTION OF GASTROINTESTINAL HORMONES ON SODIUM TRANSPORT ACROSS SALIVARY DUCT EPITHELIUM [Abstract]. (Eng.) Denniss, A. R.; Young, J. A. (Dept. Physiology, Univ. Sydney, Sydney, Australia). *Clin. Exp. Pharmacol. Physiol.* 4(5):480; 1977.

See also, 1697, 2154, 2213, 2547, 2583, 2598.

MOTILITY

1744 MANOMETRIC STUDIES OF THE UPPER ESOPHAGEAL SPHINCTER. (Eng.) Berlin, B. P.; Tedesco, F.; Fierstein, J. T.; Ogura, J. H. (Washington Univ. Medical Sch., 517 S. Euclid, St. Louis, MO 63110). *Ann. Otol. Rhinol. Laryngol.* 86(5, Part 1):598-602; 1977.

A modification of a multiluminal catheter was used to study the pharyngoesophageal sphincter (PES) in 6 normal patients and in 13 patients who had undergone partial laryngeal surgery. Manometry is carried out with a six-lumen catheter where lateral orifices are spaced at 60-degree intervals around the circumference of the catheter at the same level. The backbone of this catheter is a length of polyvinyl tubing with an outside diameter of 6 mm. Six pieces of 1.5-mm tubing are fused around the internal circumference of the tube. Pressure profiles in the normal patients revealed a marked increase in intraluminal pressure in the anterior-posterior direction; this increase is explained by the anatomy of the cricopharyngeal muscle, which does not insert in a median raphe. These readings were reliable and reproducible. The operative patients included nine subtotal supraglottic laryngectomies and four partial laryngopharyngectomies. Eight patients had a cricopharyngeal myotomy and five did not. Pre- and postoperative measurements in this series revealed a marked decrease in PES pressure in those patients who had a myotomy; however, all patients were decannulated and swallowed postoperatively without clinical evidence of aspiration. All future manometric studies of the PES should employ a multilumined catheter so that the differential pressures in the upper esophagus are recorded.

1745 STATIC AND DYNAMIC CHARACTERISTICS OF FLUID-FILLED ESOPHAGEAL MANOMETRY SYSTEMS. (Eng.) Ask, P.; Oberg, P. A.; Tibbling, L. (Dept. Medical Engineering, Linkoping Univ., S-581 85 Linkoping, Sweden). *Am. J. Physiol.* 233(5):E389-E396; 1977.

Esophageal manometric systems with water-filled catheters were characterized using model experiments. The examined parameters were catheter dimension, catheter compliance, catheter resistance, pump type, pump compliance, and perfusion flow. Accurate static pressure measurements were obtained for perfused systems independently of the parameters investigated. The dynamic characteristics varied with catheter diameter and perfusion flow. For catheters with low diameter, a narrow band width was obtained for the investigated perfusion flows. The results are expressed in terms of an electric model of the measurement system. Perfusion pumps with low compliance are recommended to improve the dynamic properties of the measurement system.

1746 ESOPHAGEAL MANOMETRY IN THE OPOSSUM. (Eng.) Schulze, K.; Dodds, W. J.; Christensen, J.; Wood, J. D. (Univ. Iowa Coll. Medicine, Iowa City, IA 52242). *Am. J. Physiol.* 233(3): E152-E159; 1977.

Esophageal manometry was carried out in normal opossums to provide basal data about normal esophageal motor functions *in vivo*. At rest, separate and distinct high pressure zones were recorded at the level of the lower esophageal sphincter, diaphragmatic hiatus, aortic arch, and upper esophageal sphincter. Each zone demonstrated a characteristic pattern of pressures in the radii of the coronal section and a characteristic response to swallowing. Pressures in the sphincters fell with swallowing. Peristalsis was not bolus-dependent and occurred with 98% of swallows. Pressures generated by peristalsis were greater in the middle of the esophagus than at the ends. Values for resting lower esophageal sphincter pressure and the characteristics of peristalsis were reproducible between different studies in the same animals.

1747 LOWER SPHINCTER OF THE OPOSSUM ESOPHAGUS IN PSEUDOPREGNANCY. (Eng.) Schulze, K.; Christensen, J. (Univ. Hosp., Iowa City, IA 52242). *Gastroenterology* 73(5):1082-1085; 1977.

The possible role of estrogen and progesterone in the development of changes in esophageal function during pregnancy was studied by producing hormone-induced pseudopregnancy in opossums. The animals received estradiol valerate (100 μg/day, i.m.) from day 1 to day 12 and medroxyprogesterone acetate (15 mg) from day 7 to day 12. Controls received no injections. Both groups underwent manometry on days 1, 7, and 12. Lower esophageal sphincter pressure decreased ($p<0.05$) in treated animals from 58 ± 13 mm Hg and 57 ± 11 on days 1 and 7, resp., to 44 ± 10 mm Hg on day 12. The lower esophageal sphincter pressure remained unchanged in controls. In both groups, there was no change in peristaltic wave pressure, duration, or velocity in the distal 6 cm of the esophagus. No abnormal peristaltic phenomena were observed. Esophageal muscle strips prepared from treated animals showed responses to electrical field stimulation of intrinsic nerves that were like those from control animals. The same was true for responses to acetylcholine and pentagastrin. Total tissue water and total tissue potassium content did not differ in treated and control animals. The fact that the lower esophageal sphincter is situated well below the diaphragmatic hiatus in the opossum, making the pressures produced by these two structures clearly differentiated on manometry, indicates that the effect of estradiol and progesterone on the lower esophageal sphincter pressure is not attributable to changes at the diaphragmatic hiatus.

1748 LOWER-ESOPHAGEAL SPHINCTER FUNCTION DOES NOT DETERMINE RESTING UPPER-ESOPHAGEAL SPHINCTER PRESSURE. (Eng.) Berte, L. E.; Winans, C. S. (Univ. Chicago Pritzker Sch. Medicine, Chicago, IL). *Am. J. Dig. Dis.* 22(10):877-880; 1977.

Records of 269 esophageal motility studies of patients without prior gastroesophageal surgery, achalasia, scleroderma, gastroesophageal malignancy, or peptic esophageal strictures were reviewed to determine the relationship between lower esophageal sphincter (LES) function and upper esophageal sphincter (UES) pressure. Average and greatest UES pressures were similar in patients with LES pressures less than 10 mm Hg or greater than 20 mm Hg, and in patients with and without gastroesophageal reflux as determined by an intraesophageal pH electrode test. The belief that patients with weak lower esophageal sphincters and gastroesophageal reflux have stronger upper esophageal sphincters to guard against pharyngeal reflux and aspiration cannot be confirmed by current manometric techniques.

1749 MYOGENIC AND NEURAL CONTROL SYSTEMS FOR ESOPHAGEAL MOTILITY. (Eng.) Sarna, S. K.; Daniel, E. E.; Waterfall, W. E. (McMaster Univ. Medical Center, 4W8, 1200 Main St. West, Hamilton, Ontario L8S 4J9, Canada). *Gastroenterology* 73(6): 1345-1352; 1977.

The role of myogenic and neural control systems in esophageal motility was studied in anesthetized opossums by applying electrical pulses at 20 to 40 V and 100- to 400-msec pulse width directly to muscle layers, by cervical vagal stimulation (10-25 pulses/sec, 0.5- to 5-msec pulse width, 10-40 V), and by balloon distention. Direct muscle stimulation resulted in a propagated contraction in 13 of 22 opossums (proximal propagation from a distal stimulation site and vice versa). The velocity of propagation was of the same order of magnitude as that of a spontaneous swallow (<5 cm/sec). The propagated contractions were not blocked by i.v. or close intra-arterial (i.a.) atropine (100-500 μg/kg, i.v.; 100-400 μg/kg, i.a.), hexamethonium (5-10 mg/kg, i.v.; 10 mg, i.a.), or by intra-arterial tetrodotoxin (20 μg). Smooth muscle depolarization by i.a. 40 mM KCl or tetraethylammonium (10 mg) brought about propagated contractions in those opossums that did not show this in the first place. Generally, these propagated contractions could also be initiated in these opossums by applying 2 to 3 stimulating pulses 1 to 1.5 sec apart. The propagated contractions in response to direct muscle stimulation were observed in all opossums 2 to 20 min after death. Cessation of vagal stimulation and balloon relaxation produced "off-responses" that were blocked by tetrodotoxin. The propagation of off-responses was much faster than the swallow-induced peristaltic contractions. The myogenic control system in the esophagus is capable of producing propagated contractions independently, which resemble normal esophageal peristalsis in propagation velocity and may be the underlying system responsible for it. This system may, however, be modulated by the extrinsic and intrinsic nerves.

1750 AGE-RELATED CHANGES IN FORCE, STRESS, AND PRESSURE OF LOWER ESOPHAGEAL SPHINCTER OF THE RAT.

(Eng.) Biancani, P.; Behar, J.; Zabinski, M. P. (Dept. Internal Medicine, Yale Univ., New Haven, CT 06510). *Am. J. Physiol.* 233(5):E407-E415; 1977.

Age-related changes in the mechanical characteristics and changes in the dimensions of the lower esophageal sphincter (LES) were investigated in Sprague-Dawley rats. Transversely cut lower esophageal sphincter rings of 3-week-, 6-week-, 3-month-, and 1-yr-old rats were studied *in vitro* at 80 cycles/sec stimulation (50 mA, 2 msec). *In vivo* length (circumference) and thickness of the circular muscle layer was found to increase with age. The length at which the muscle exerted maximum active force during electrical stimulation occurred for all age groups at approximately three times the *in vivo* length. When compared with adjacent sections, the sphincter exerted the highest active force and stress, both at the *in vivo* length and at the length of maximum active force. A large increase in the active force was observed in rats between 3 and 6 weeks, followed by a small decrease in the 1-yr-old rats. The active stress remained nearly constant between the ages of 3 weeks and 3 months and decreased thereafter. The large increase in active force observed between 3 and 6 weeks was caused by a slight increase in muscle contractility as well as by a more than threefold increase in the amount of circular muscle present. In rats older than 6 weeks, however, the active contractile force fell slightly, in spite of increased muscle mass, due to a substantial decrease in muscle contractility. Pressure-diameter relationships calculated from the *in vitro* force-length data and compared with previously determined *in vivo* pressure-diameter data, demonstrate good correlation between the *in vivo* and *in vitro* data.

1751 EFFECT OF CIGARETTE SMOKING ON THE LOWER OESOPHAGEAL SPHINCTER: ASSESSMENT OF NORMAL AND SYMPTOMATIC PATIENTS USING THE RAPID PULL-THROUGH TECHNIQUE OF OESOPHAGEAL MANOMETRY.

(Eng.) Chattopadhyay, D. K.; Greaney, M. G.; Irvin, T. T. (Royal Infirmary, Sheffield, England). *Gut* 18(10): 833-835; 1977.

A rapid pull-through technique of manometry was used to determine the effect of cigarette smoking on lower esophageal sphincter pressure (LESP) in 10 asymptomatic volunteers and in 10 patients with gastroesophageal reflux. Basal LESP measurements in the two groups were not significantly different, but LESP was reduced by 19% in asymptomatic subjects ($p<0.01$) and by 21% in symptomatic patients ($p<0.02$) during cigarette smoking. The results suggest that smoking should be avoided in the clinical management of gastroesophageal reflux.

1752 INTESTINAL MYOELECTRIC ACTIVITY AFTER ACTIVATION OF CENTRAL EMETIC MECHANISM.

(Eng.) Stewart, J. J.; Burks, T. F.; Weisbrodt, N. W. (Texas Medical Center, Houston, TX 77030). *Am. J. Physiol.* 233(3):E131-E137; 1977.

Changes in intestinal myoelectric activity after the intraventricular or peripheral injection of emetic drugs were studied in cats. Morphine (200 µg), apomorphine (200 µg), or epinephrine (150 µg) were injected either into a lateral cerebral ventricle or i.p. in cats implanted with monopolar, extracellular electrodes along the entire small intestine. Intraventricular injection of the agents produced emesis in a number of animals tested (4/10, 4/11, and 8/11 with morphine, apomorphine, and epinephrine, resp.). Each episode of retching and vomiting was preceded by a characteristic intestinal myoelectric pattern that consisted of the following: a dampening in slow-wave amplitude, followed by an intense burst of spike potentials that lasted several seconds. The pattern was recorded first in the distal small intestine, then migrated orad at a velocity of 2-3 cm/sec. After emesis, slow-wave frequency was reduced at recording sites along the entire small intestine. Atropine (100 µg/kg, i.p.) did not affect the emetic potency of epinephrine but abolished both the orally migrating spike-burst complex and the reduction in slow-wave frequency associated with vomiting. Naloxone (200 µg, intraventricularly) abolished morphine- and apomorphine-induced emesis without affecting the emetic potency of epinephrine; phentolamine (200 µg, intraventricularly) antagonized the emetic action of epinephrine without diminishing the emetic potency of morphine. No emesis, intestinal spike-burst complex, or changes in slow-wave frequency occurred after the i.p. administration of the emetic agents at the same doses effective centrally. Activation of the central emetic mechanism is associated with a myoelectric pattern recorded from the small intestine indicative of a reverse peristaltic wave.

1753 MIGRATING MYOELECTRICAL COMPLEX OF THE SMALL INTESTINE: AN INTRINSIC ACTIVITY MEDIATED BY THE VAGUS.

(Eng.) Ruckebusch, Y.; Bueno, L. (Ecole Nationale Veterinaire, 31076 Toulouse Cedex, France). *Gastroenterology* 73(6):1309-1314; 1977.

The relative influence of neural versus hormonal components on the migrating myoelectrical complex (MMC) pattern and its disruption by feeding was studied in dogs. In healthy, conscious parenterally fed dogs and in sheep fed their usual diet, the MMC comprised two distinct phases termed irregular and regular spiking activity and was followed by a period of quiescence. The pattern persisted after bilateral transthoracic vagotomy and in animals with alloxan-induced diabetes. In dogs, feeding disrupted the MMC pattern by obliterating the phases of regular spiking activity and quiescence for 6 to 12 hr, depending upon the amount of dry matter intake. After vagotomy, a latency in the disruption of the migrating myoelectrical complex pattern with feeding occurred and in vagotomized, diabetic dogs, the duration of disruption was strongly reduced. In sheep, the duration of irregular spiking activity of a jejunal segment increased or decreased corresponding to the bulk of digesta, a phenomenon damped after vagotomy. The results indicate that the role of the vagus is limited to (a) prompting prandial disruption, which is then maintained by hormonal effect; and (b) regulating the irregular spiking activity duration in relation to the bulk of digesta.

1754 THE GASTROINTESTINAL MYOELECTRIC RESPONSE TO 13-Nle-MOTILIN INFUSION DURING INTERDIGESTIVE AND DIGESTIVE STATES IN THE CONSCIOUS DOG.

(Eng.) Wingate, D. L.; Ruppin, H.; Thompson, H. H.; Green, W. E. R.; Domschke, W.; Wunsch, E.; *et al.* (London Hosp. Medical Coll., Whitechapel, London E1 1BB, England). *Acta Hepatogastroenterol.* 24(4):278-287; 1977.

To determine whether 13-norleucine motilin (13-nle-motilin) enhances small intestinal electrical spike activity in conscious dogs under physiological conditions, as it does in the isolated preparation, intestinal myoelectric activity was studied in three fasted dogs with electrodes surgically implanted in the stomach and small intestine, during separate and combined i.v. infusions of 13-nle-motilin and pentagastrin (PG). Basal recordings confirmed the presence of regular interdigestive myoelectric complexes (MCs). In doses under 50 ng/kg/hr, 13-nle-motilin was without effect; higher doses (up to 400 ng/kg/hr) resulted in the interpolation of one or more MCs in the spontaneous sequence. The rate of aboral transit of 13-nle-motilin-induced MCs did not differ significantly from that of spontaneous MCs. When MCs were abolished by feeding or PG infusion, simultaneous 13-nle-motilin administration was without effect on spike activity, but slightly attenuated the accelerating effect of gastrin on the gastric pacemaker frequency. The myoelectric events triggered by 13-nle-motilin suggest that in the conscious dog the polypeptide may not act directly on the smooth muscle cell, as it does *in vitro*, but through an extra-enteric neural control mechanism that is uncoupled by gastrin.

1755 THE CONTRIBUTION OF PROSTAGLANDINS IN THE MUSCLE OF HUMAN ISOLATED SMALL INTESTINE TO NEUROGENIC RESPONSES.

(Eng.) Bennett, A.; Stockley, H. L. (King's Coll. Hosp. Medical Sch., Denmark Hill, London SE5 8RX, England). *Br. J. Pharmacol.* 61(4):573-578; 1977.

The contribution of prostaglandins to neurogenic responses in the longitudinal and circular muscle was studied in the human ileum. In strips cut parallel to the longitudinal or circular muscle, indomethacin (2-10 μg/ml) usually lowered the tone, thus probably accounting for the reduction of nerve-mediated relaxations to electrical field stimulation. In longitudinal muscle strips, indomethacin enhanced contractions that occurred during electrical stimulation, probably because tone fell, but antagonized after-contractions. In the circular muscle, indomethacin reduced initial contractions but enhanced after-contractions. Prostaglandin E_2 (100 ng/ml) counteracted all of the effects of indomethacin in the longitudinal muscle and most of those in the circular muscle; prostaglandin F_{2_α} (100 ng/ml) restored circular muscle tone. The results suggest that prostaglandins affect the muscle directly and contribute to the regulation of tone. They may also mediate noncholinergic contraction in longitudinal muscle and suppress contractility in the circular muscle.

1756 CORRELATION OF VARIATIONS IN INTRALUMINAL PRESSURE AND POTENTIAL DIFFERENCES IN THE PERFUSED COLON.

(Eng.) Postaire, J. G.; Gerard, J.; Devroede, G.; Van Houtte, N. V. (Departement du Genie Electrique, Universite de Sherbrooke, Sherbrooke, Quebec, Canada). *Gut* 18(10):771-778; 1977.

To investigate the nature of variations in the large intestinal potential differences, a continuous perfusion of isotonic saline was carried out in the colon of 14 rats. Intraluminal pressure and potential differences between the lumen and the peritoneal cavity were continuously and simultaneously recorded, while impedance of the system and respiration were also constantly monitored. To obtain a quantitative evaluation of the data, Fast Fourier Transform was performed on the signals and their derivatives, which were auto- and cross-correlated. While there was no obvious relation between pressure and potential in the unperfused colon, there was clear visual qualitative evidence that, during steady-state conditions of perfusion, an increase in intraluminal pressure was accompanied by a decrease in potential differences, while impedance of the recording system remained unchanged. Computer analysis disclosed four narrow ranges of stable frequencies for both pressure and potential. They were centered around 0.3, 1.75, 10.7, and 75 cycles/min, the latter being synchronous with respiration. It is concluded that the variations of potential differences recorded during perfusion are not electrical artifacts; the fast rhythm is probably induced by respiration, which increases intracolonic pressure and that, in turn, reduces the absolute value of potential differences, which remain negative mucosa *versus* serosa. The slower rhythms are synchronous for pressure and potential.

1757 HUMAN COLONIC MYOELECTRIC ACTIVITY IN RESPONSE TO PROSTIGMIN AND THE GASTROINTESTINAL HORMONES.

(Eng.) Snape, W. J., Jr.; Carlson, G. M.; Cohen, S. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Am. J. Dig. Dis.* 22(10):881-887; 1977.

Colonic myoelectric activity was determined using a mucosal clip electrode in 12 normal subjects and in cats, both in the basal state and following the administration of prostigmin, pentagastrin, cholecystokinin, or secretin. Slow-wave activity was present 49 ± 3.0% of the recording time in man and occurred at two frequencies, 6.5 ± 0.1 cycles/min and 3.5 ± 0.1 cycles/min, in the rectum. Spike potentials were infrequent in the basal state. Prostigmin (1.0 mg, i.m.), pentagastrin (0.5 μg/kg, i.v.), or cholecystokinin (1.0 U/kg) did not affect the slow-wave activity or frequency, but these agents significantly increased the number of spike potentials ($p<0.05$). Secretin had no effect on myoelectric activity. The electrode system was tested in the cat and showed excellent correlation of the myoelectric activity between the mucosal clip electrode and a serosal electrode. These studies indicate that a mucosal clip electrode provides an accurate method of recording colonic myoelectric activity when compared to a serosal electrode in the cat. In man, slow-wave activity is present only intermittently and exists at two frequencies. Gastrointestinal hormones and prostigmin increase spike potential discharge without altering slow-wave activity or frequency.

1758 EFFECT OF CAPSAICIN ON ELECTRICAL SLOW WAVES IN THE ISOLATED CAT COLON.

(Eng.) Anuras, S.; Christensen, J.; Templeman, D. (Dept. Internal Medicine, Univ. Iowa, Iowa City, IA 52242). *Gut* 18(8):666-669; 1977.

To determine whether the laxative effect of capsaicin involves an alteration of electrical slow waves of the colon, the effect of that agent on the electromyogram of the isolated cat colon was examined. At a concentration of 10^{-4} M, it caused a significant reduction in the frequency of the electrical slow waves in the proximal half of the colon. The frequency fell to its lowest value, 45% of control ($p<0.001$), in the most proximal 10% of the organ below the ileocecal junction, and the effect progressively diminished along the colon. In the distal half of the colon, the change in frequency was not significant. Sectioning of the colon into segments reduced the frequency of the slow waves in the proximal half of the colon, and capsaicin further reduced the frequency in the segments representing the proximal 30% of the colon. The results suggest that the capsaicin effect is an uncoupling of slow wave oscillators.

1759 EFFECTS OF GLUCAGON AND SECRETIN ON FOOD- OR MORPHINE-INDUCED MOTOR ACTIVITY OF THE DISTAL COLON, RECTUM, AND ANAL SPHINCTER.

(Eng.) Chowdhury, A. R.; Lorber, S. H. (777 Court St., Reading, PA 19601). *Am. J. Dig. Dis.* 22(9):775-780; 1977.

The effects of glucagon and secretin on food- or morphine-induced motor activity of the distal colon, rectum, and internal anal sphincter were investigated in 12 healthy subjects. Intraluminal pressure changes were measured using a triple-lumen polyvinyl tube assembly with three side orifices. Glucagon (3 μg/kg over 30 sec, followed by a continuous infusion of 30 μg/kg/hr, i.v.) caused significant inhibition of food- or morphine (0.1 mg/kg, i.v.)-induced motor activity of both the distal colon and rectum. In contrast, secretin (0.5 U/kg over 30 sec, followed by 2 U/kg/hr, i.v.) did not suppress morphine-induced motor activity but did significantly inhibit food-stimulated motor activity of the distal colon. The inhibitory effect of secretin on motor activity of the rectum was insignificant. Morphine, but not food, elevated the pressure of the anal sphincter, which was not affected by glucagon or secretin. Hyperglycemia, produced by the infusion of 5% glucose, had no effect on motor activity. These studies demonstrate that glucagon but not secretin, in the doses employed, inhibits morphine-induced motor wave activity of both the distal colon and rectum and that this inhibitory effect is not secondary to hyperglycemia. Furthermore, the rise in anal sphincter pressure is not affected by glucagon or secretin.

1760 STUDY OF GASTRIC EMPTYING USING A FERROMAGNETIC TRACER.

(Eng.) Benmair, Y.; Dreyfuss, F.; Fischel, B.; Frei, E. H.; Gilat, T. (Weizmann Inst. Science, Rehovot, Israel). *Gastroenterology* 73(5):1041-1045; 1977.

A new ferromagnetic method for the measurement of gastric emptying is described, and the results of gastric emptying studies in 61 subjects with normal gastric motility are presented. An inert tracer, magnesium ferrite, is added to a test meal. Its amount in the stomach is then measured at regular intervals by an external transducer using its ferromagnetic properties. The method is noninvasive and devoid of radiation exposure. The magnetic fields used are harmless. The shape of the gastric emptying curve obtained in the 61 subjects conformed best to an exponential function. The mean half-time of gastric emptying was 49 ± 17.4 min. In this limited series, age and sex did not affect gastric emptying. In 14 of 15 cases, there was a good correlation between the results of this method in determining the end point of gastric emptying and those of an x-ray method. This ferromagnetic method appears to be uncomplicated, inexpensive, reliable, and reproducible.

1761 CANINE GASTRIC EMPTYING OF SOLIDS AND LIQUIDS.

(Eng.) Hinder, R. A.; Kelley, K. A. (Mayo Medical Sch., Rochester, MN 55901). *Am. J. Physiol.* 233(4):E335-E340; 1977.

To test the hypothesis that liquids are emptied from the stomach, whereas solids are retained for reduction to a size suitable for passage into the duodenum, gastric emptying of labeled solids and a liquid was simultaneously assessed by quantitating the rate of appearance of the gastric markers in the duodenum. Four dogs received a digestible solid (50 g of liver tagged with $[^{57}Co]$cyanocobalamine and diced into 1-cm cubes), an indigestible solid (40 radiopaque plastic spheres, diameter 7 mm), and a liquid (400 ml of either 1% or 10% dextrose tagged with polyethylene-[1,2-^{3}H]glycol). The rate of gastric emptying of cubed liver was similar whether the liver was given alone or with solutions of the rapidly emptying 1% dextrose, but its rate of emptying was slowed by the slower emptying 10% dextrose. Homogenization of the liver speeded its emptying. Moreover, the homogenized liver emptied even faster when dispersed in 1% dextrose and emptied more slowly when dispersed in 10% dextrose, but in both instances the liver emptied at the same rate as the solution with which it was mixed. Indigestible spheres were nearly all retained, whereas the liver and the dextrose were emptied. It appears that the stomach empties liquids and retains solids for reduction to a smaller size, after which they are discharged at the same rate as the liquid then present in the stomach.

1762 GASTRIC EMPTYING OF WHOLEMEAL AND WHITE BREAD. (Eng.) Grimes, D. S.; Goddard, J. (Withington Hosp., Manchester M20 8LR, England). *Gut* 18(9):725-729; 1977.

The rates at which solid and liquid leave the stomach after meals of whole-meal and white bread were studied in 11 normal subjects (9 men, 2 women) and in rats, using a double isotope technique. There was no difference in the rates at which the solid phases of the gastric contents left the stomach, but liquid left the stomach significantly more rapidly with white bread than with whole-meal bread ($p<0.005$). Furthermore, the amount of liquid leaving the stomach unaccompanied and therefore unbuffered by solid was significantly greater after white bread than whole-meal bread. These findings may be of significance in the pathogenesis of duodenal ulcer, and it is suggested that the substitution of whole-meal bread for white bread might be of benefit to patients with duodenal ulcer and nonulcer dyspepsia.

1763 MYOELECTRICAL AND MECHANICAL ACTIVITY DURING THE EMPTYING OF LIQUID TEST MEALS FROM THE ISOLATED CANINE STOMACH. (Eng.) Kowalewski, K.; Kolodej, A. (Surgical-Medical Res. Inst., Univ. Alberta, T6G 2N8 Edmonton, Alberta, Canada). *Rend. Gastroenterol.* 9(2):122-126; 1977.

The effect of liquid meals on gastric emptying, antral electrical activity, and antral mechanical activity was studied in 14 isolated canine stomachs, perfused *ex vivo* with homologous blood. The following liquid meals were used: normal saline, 50 mM HCl, 30% glucose, 80 mM sodium oleate, and 15% liver extract. The emptying of acid meal and of liver extract was slower than the emptying of the other meals. The frequency of electrical control activity (ECA) was significantly decreased after the acid meal (4.6 ± 0.4 ECA/min) and increased after liver extract (6.0 ± 0.2 ECA/min), as compared with the effect of other meals on ECA. The force and frequency of antral contractions increased after the liver extract meal, and was low after the acid meal, confirming the results of previous *in vivo* studies on humans and dogs.

1764 EFFECTS OF GASTROINTESTINAL HORMONES ON THE ELECTRICAL AND MECHANICAL ACTIVITY OF THE CAT STOMACH. (Eng.) Ohkawa, H.; Watanabe, M. (Yamaguchi Univ. Sch. Medicine, Ube 755, Japan). *Tohoku J. Exp. Med.* 122(3):287-298; 1977.

The effects of gastrointestinal hormones on electrical and mechanical activity of smooth muscle of the cat stomach were studied. Spontaneous electrical activity of antrum preparations consisted of slow waves with superimposed spike-like potentials. Phasic contractions occurred synchronously with the electrical activity. Pentagastrin (1.25×10^{-7}-2.5×10^{-7} g/ml), tetragastrin (1.25×10^{-7} g/ml), pancreozymin (0.05-0.1 U/ml), and secretin (0.05-0.25 U/ml) increased the frequency of slow wave component and the amplitude of phasic contraction. Atropine (2.5×10^{-6} g/ml) and tetrodotoxin (1.6×10^{-7} g/ml) did not block the spike-like potential and slow wave component. Norepinephrine (5×10^{-6} g/ml) and verapamil (3×10^{-6}-1×10^{-5} g/ml) blocked the phasic contraction. The excitatory effects of these gastrointestinal hormones were observed in the presence of atropine, tetrodotoxin, and dibenamine, but not with verapamil. When the mechanical activity of the antral strips was depressed by caffeine or theophylline, the excitatory effects of gastrointestinal hormones were also suppressed. The excitatory effects produced by these hormones were potentiated by imidazole. These results suggest that gastrointestinal hormones have a direct excitatory action on the longitudinal smooth muscle of the antrum and that the excitatory action is associated with phosphodiesterase activity and intracellular cyclic AMP content.

1765 EFFECT OF SYNTHETIC MOTILIN ON GASTRIC MOTOR ACTIVITY IN CONSCIOUS DOGS. (Eng.) Itoh, Z.; Takeuchi, S.; Aizawa, I.; Takayanagi, R. (Gunma Univ. Sch. Medicine, Maebashi 371, Japan). *Am. J. Dig. Dis.* 22(9):813-819; 1977.

The effect of the i.v. infusion of synthetic motilin on gastric motor activity was investigated by means of chronically implanted force transducers in four conscious dogs. Since the gastric motor pattern was found to consist of two major subpatterns during a 24-hr period, i.e., digestive and interdigestive motor activity, motilin was tested for its motor stimulating activity in both states. The digestive pattern was characterized by steady, low-amplitude antral contraction, while the interdigestive pattern consisted of a series of high-amplitude contractions in both the gastric body and antrum, with intervening and long-lasting motor quiescence. Motilin had no influence upon gastric motor activity in the digestive state. However, during the interdigestive state, motilin (0.3-2.7 μg/kg/hr) induced motor activity similar to the naturally-occurring interdigestive contractions in a dose-related fashion. Since motilin is released by duodenal alkalinization in the dog, it is postulated that motilin is a substance to control the interdigestive contractions in the dog, although other reports describe motilin release by duodenal acidification and inhibition of gastric emptying in man. Endogenous stimuli leading to motilin release may be different among species. This study indicates that motilin induces a contractile pattern similar to that seen during the interdigestive state in conscious dogs.

1766 MOTILIN ENHANCES GASTRIC EMPTYING OF LIQUIDS IN DOGS.

(Eng.) Debas, H. T.; Yamagishi, T.; Dryburgh, J. R. (Dept. Surgery, Univ. British Columbia, 700 W. 10th Ave., Vancouver, British Columbia V5Z 1L5, Canada). *Gastroenterology* 73(4, Part 1):777-780; 1977.

The effect of natural motilin on gastric emptying of liquids was studied in dogs before and after either truncal vagotomy or antrectomy or both. The rate of gastric emptying was determined in six dogs with gastric fistulae by measuring the volume of fluid remaining in the stomach 10 min after instillation of 300 ml of 0.15 M NaCl containing phenol red (60 mg/l) as marker. The rate of emptying was determined with the dogs receiving only saline (controls) and while different doses of motilin were infused i.v. The rate of emptying of a solid meal was studied by measuring the amount of solid material (weight after desiccation) left in the stomach 15, 30, 60, 90, and 120 min after a meal of proprietary dog food equivalent in dry weight to 3 g/kg of body weight. Motilin was found to be a potent accelerator of gastric emptying of liquids but not of solids. The antrum was not needed for this action. Vagotomy shifted the dose-response curve to the right, increasing the half-dose 10-fold. These findings suggest that motilin acts on the proximal stomach to enhance emptying and that its potency depends on the presence of vagal tone. They also support the hypothesis that the proximal stomach mainly controls the emptying of liquids.

1767 EFFECTS OF VAGOTOMY ON THE ULTRASTRUCTURE OF THE NERVES OF DOG STOMACH.

(Eng.) Oki, M.; Daniel, E. E. (McMaster Univ. Medical Center, Hamilton, Ontario L8S 4J9, Canada). *Gastroenterology* 73(5):1029-1040; 1977.

The effects of vagotomy on the gastric neuronal apparatus were studied ultrastructurally in five female dogs. A portion of the presynaptic terminals on neurons of the Auerbach's and Meissner's plexuses degenerated. The residual terminals presumably arose from intrinsic neurons. The neurons were of several types: (a) large motor neurons with synaptic connections that could not be distinguished from one another morphologically as to excitatory or inhibitory function and that underwent postdenervation changes and (b) presumed sensory neurons without detectable synaptic connections, which were unaffected by vagotomy, and which could be subdivided into two types. Other neuronal profiles with many large vesicles were observed only after vagotomy. The nerves to muscle layers contained small agranular vesicles and large dense-cored vesicles, sometimes with a predominance of one vesicle type or the other. It was not possible to determine whether these represented two morphological nerve types or sampling variations from a single structural type. Neither vesicle type seemed to be selectively affected by vagotomy. A few axons, presumably adrenergic, with small agranular vesicles, were observed, chiefly near blood vessels but also a few in the plexuses and in the muscle layers of the pyloric region. They were not obviously affected by vagotomy.

1768 THE INITIAL PHASE OF GASTRIC EMPTYING BEFORE AND AFTER VAGOTOMY AND PYLOROPLASTY.

(Eng.) Sheiner, H. J.; Thompson, I. J.; Hamilton, S. G. L.; Quinlan, M. F. (Perth Medical Center, Nedlands, Western Australia 6009, Australia). *Aust. N.Z. J. Surg.* 47(3):419-423; 1977.

The initial phase of gastric emptying of solid food was monitored in 10 normal subjects and in 12 patients who had undergone truncal vagotomy and pyloroplasty for duodenal ulcer at least 12 months previously. A gamma camera and on-line computer facilities were used for monitoring. In normal subjects, a consistent pattern was seen comprising an early delay in the onset of emptying (plateau), followed by an exponential decay curve. After vagotomy, the plateau was lost, and the exponential pattern of emptying began once the stomach was full. There was no evidence of sudden "dumping" of contents from the stomach. The overall rates of emptying as measured by the half-emptying time were the same in normal and postvagotomy patients. The faster initial phase of emptying after vagotomy is probably due to a loss of the normal plateau rather than to a sudden precipitous dumping of food out of the stomach.

1769 GASTRIC EMPTYING IN THE RAT IS INHIBITED B THE DUODENAL ULCEROGENS, CYSTEAMINE AND PROPIONITRILE.

(Eng.) Lichtenberger, L. M.; Szabo, S.; Reynolds, E. S. (Univ. Texas Medical Sch. at Houston, 6400 W. Cullen, Houston, TX 77030). *Gastr enterology* 73(5):1072-1076; 1977.

The effect of cysteamine (28 mg/100 g, intragastrically) or propionitrile (6 mg/100 g, s.c.) on gastri emptying was investigated by measuring the disappearance of intragastrically administered [^{57}Co]-vitamin B_{12} from the stomach of rats pretreated with these drugs or with water (controls). When either of the test compounds was administered 4 hr before the indicator, the gastric emptying rate was markedly retarded; the calculated half-time of removal of the [^{57}Co]vitamin B_{12} was 12 min, 56 min, and 104 min in rats given water, cysteamine, and propionitrile, resp. Gastric emptying was still significantly retarded 24 hr after the administration of cysteamine. The maximum effect of cysteamine, however, occurred 30 min after drug administration. Subsequent studies demonstrated that pyloroplasty was ineffective, whereas vagotomy completely blocked cysteamine-induced gastric retention. The duodenal ulcerogens therefore, may act like other factors that retard gastric emptying by acting on a vagally-dependent property of the proximal stomach to accommodate increasing volumes of liquid. These results suggest the possibility that this action of cysteamine and propionitrile to delay gastric emptying may be required for experimental ulcer formation.

1770 A MODEL FOR TREATING POST-IRRADIATION NAUSEA AND VOMITING IN MAN: THE ACTION OF INSULIN IN ABOLISHING RADIATION-INDUCED DELAY IN GASTRIC EMPTYING IN THE RAT. (Eng.) Hulse, E. V.; Patrick, G. (M.R.C. Radiobiology Unit, Harwell, Didcot, Oxon OX11 ORD, England). *Br. J. Radiol.* 50(597):645-651; 1977.

Radiation-induced delay of gastric emptying in rats, which may be comparable to radiation-induced nausea and vomiting in man, was successfully treated with insulin. After 200 R of whole-body x-ray exposure, the stomach of rats rarely showed any evidence of emptying over a 7-hr observation period. When a dose of 1.0 U of soluble insulin was given s.c. immediately after the first post-irradiation radiograph, the stomach began to empty immediately and continued to empty much faster than in unirradiated controls. Biphasic insulin, given immediately after the first post-irradiation radiograph, overcame radiation-induced gastric delay, but was without the precipitate emptying characteristic of soluble insulin. After 200 R of whole-body x-ray exposure, a dose of 0.5 U of biphasic insulin resulted in a stomach emptying rate that was virtually the same as that of unirradiated controls; with larger biphasic insulin doses, the stomach emptying rate was faster than in controls, and with smaller doses, the effect was proportionally reduced. Patterns of response to biphasic insulin were similar with larger radiation doses; an insulin dose of 1.0 U was required to restore normal gastric emptying after 600 R of x-rays, and a dose of 2.5 U was needed after 1,000 R of x-ray exposure. There was no simple correlation between the hypoglycemic action of insulin and its effect on stomach emptying. For example, in rats fed a barium meal containing malted milk and exposed to 200 R of x-rays, 0.1 U of insulin partially restored gastric emptying, but did not lower the plasma glucose level. Additional work is required to determine whether enteroglucagon or other intestinal hormones are involved in the actions of radiation and insulin on gastric motility. It is suggested that the use of insulin to treat radiation-induced nausea and vomiting in humans should be considered.

1771 MODIFYING EFFECT OF BRADYKININ ON MOTOR ACTIVITY IN THE GUINEA-PIG GALL BLADDER. (Eng.) Stasiewicz, J.; Szalaj, W.; Gabryelewicz, A. (Gastroenterology Clinic, Str. M.C. Sklodowskiej 24a, 15-276 Bialystok, Poland). *Clin. Exp. Pharmacol. Physiol.* 4(6):561-564; 1977.

The interaction of bradykinin and cholecystokinin preparations was investigated in the isolated guinea pig gallbladder. Bradykinin (1-100 ng/ml) induced dose-dependent contractile effects that were considerably smaller than those produced by cholecystokinin octapeptide. A low bradykinin concentration (1.0 ng/ml) caused a significant increase of the contraction induced by cholecystokinin octapeptide ($p<0.001$) and natural cholecystokinin-pancreozymin ($p<0.01$), and also augmented the effects of acetylcholine on this preparation. These effects are thus probably not specific for cholecystokinin.

1772 EFFECT OF VASOACTIVE INTESTINAL POLYPEPTIDE ON BASAL AND CHOLECYSTOKININ-INDUCED GALLBLADDER PRESSURE. (Eng.) Ryan, J.; Cohen, S. (Temple Univ. Sch. Medicine, Philadelphia, PA 19140). *Gastroenterology* 73(4, Part 1):870-872; 1977.

The pressure response of the opossum gallbladder to vasoactive intestinal polypeptide (VIP) alone and in combination with cholecystokinin (CCK) was studied *in vivo*. VIP alone (2.4 and 8 μg/kg/hr) produced dose-related decreases in basal gallbladder pressure ($p<0.05$). VIP eliminated spontaneous contractile activity when present, and it significantly antagonized the expected pressure response to CCK infusion. These observations support the proposal that the regulation of gallbladder motility depends upon the actions and interactions of the gastrointestinal hormones on gallbladder smooth muscle.

1773 CONDUCTION OF ACTIVITY BETWEEN MUSCLES IN THE TERMINAL REGION OF THE COMMON BILE DUCT AND IN THE NEIGHBORING DUODENUM. (Eng.) Nakayama, S.; Fukuda, H. (Okayama Univ. Medical Sch., Okayama 700, Japan). *Acta Med. Okayama* 30(1):21-35; 1976.

The relationship between muscle activity at the terminal region of the common bile duct and the duodenal muscle was examined in rabbits. Rhythmic muscle activity in the terminal region was synchronous with duodenal muscle activity. The activity of the latter muscle preceded the former. The activity at the terminal region synchronous with the rhythmic activity of the duodenal muscle sometimes disappeared spontaneously. At times, the muscle activity of the ampulla and the sphincter at the terminal region was independently lost. The conduction of excitation from the duodenal muscle to the terminal region appeared to occur at several sites. A "conduction-shunt path" probably exists between the terminal region and the duodenum, as well as between the ampulla and the sphincter. Some quantitative differences were found between the sphincter, ampulla, and duodenum in inhibitory effects to stimulation of splanchnic nerves and reflex effects and to excitatory effects of cholecystokinin-pancreozymin and cerulein. These results indicate that the sympathetic nerves and the intramural cholinergic neurons controlling the duodenal muscle and the terminal common bile duct muscles carry out activities quantitatively different from each other.

1774 INHIBITION BY VIP AND SECRETIN OF THE LOWER ESOPHAGEAL SPHINCTER PRESSURE IN MAN [Abstract]. (Eng.) Domschke, W.; Lux, G.; Domschke, S.; Strunz, U.; Rosch, W.; Bloom, S. R.; *et al.* (Dept. Medicine, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):484-485; 1977.

1775 REFLUX OF DUODENAL CONTENTS INTO THE CANINE PANCREATIC DUCT [Abstract]. (Eng.) Hendricks, J. C.; DiMagno, E. P.; Dozois, R. R.; Go, V. L. W. (Mayo Clinic, Rochester, MN). *Clin. Res.* 25(4):607A; 1977.

1776 PRESSURE DYNAMICS IN THE SPHINCTER OF ODDI, PANCREATIC DUCT AND COMMON BILE DUCT IN MAN DURING ERCP MANOMETRIC STUDY [Abstract]. (Eng.) Hogan, W. J.; Geenen, J. E.; Dodds, W. J.; Stewart, E. T.; Arndorfer, R. C.; Shaffer, R. D. (Medical Coll. Wisconsin, Milwaukee, WI). *Clin. Res.* 25(4):607A; 1977.

1777 GLUCOSE DELAYS GASTRIC EMPTYING [Abstract]. (Eng.) Mayle, J. E.; Wolfe, M. M.; Caldwell, J. H.; Thomas, F. B. (Dept. Medicine, Ohio State Univ., Columbus, OH). *Clin. Res.* 25(4):572A; 1977.

1778 PROLONGATION OF SMALL BOWEL TRANSIT AND EXPANSION OF BILE ACID POOLS BY PROBANTHINE ADMINISTRATION IN MAN [Abstract]. (Eng.) Duane, W. C. (Veterans Admin. Hosp., Minneapolis, MN). *Gastroenterology* 73(5):1218; 1977.

1779 ^{99}Tc(m) TAGGED CHICKEN LIVER AS A MARKER OF SOLID FOOD IN THE HUMAN STOMACH. (Eng.) Meyer, J. H.; MacGregor, I. L.; Gueller, R.; *et al.* (Veterans Admin. Hosp., San Francisco, CA 94121). *Am. J. Dig. Dis.* 21(4):296-304; 1976.

1780 MEASUREMENT OF INTRAVESICAL AND RECTAL PRESSURES SIMULTANEOUSLY WITH ELECTROMYOGRAPHY OF ANAL SPHINCTER IN CHILDREN WITH MYELOMENINGOCELE. (Eng.) Van Gool, J. D.; De Ridder, A. L. A.; Kuijten, R. H.; *et al.* (St. Elizabeth Hosp., Tilburg, Netherlands). *Develop. Med. Child. Neurol.* 18(3):287-301; 1976.

1781 UNIFIED RHYTHM OF THE SLOW WAVE OF THE SMALL AND LARGE INTESTINES IN THE ILEOCECAL REGION. (Eng.) Mizhorokova, Z.; Papasova, M. (Inst. Physiology, Bulgarian Acad. Sciences, Sofia, Bulgaria). *Dokl. Bolg. Akad. Nauk.* 29(10):1535-1538; 1976.

1782 ANORECTAL PRESSURE PROFILE. (Ger.) Kaiser, G.; Reuter, I. (Inselspital, Bern, Switzerland). *Z. Kinderchir.* 19(1):38-49; 1976.

1783 THE MOTOR FUNCTION OF THE ANTRAL VAGUS NERVE. (Eng.) Lynen, F. K. (Dept. Surgery, Klinische Anstalten der RWTH Aachen, Goethestrasse 27/29, 51 Aachen, W. Germany). *Eur. Surg. Res.* 8(Suppl. 2):67-68; 1976.

1784 THE EFFECT OF PHTHALAPROMINE AND PRINDAMINE ON GASTRIC MOTILITY. (Eng.) Stadaas, J. O.; Aune, S.; Petersen, H. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 11(Suppl. 42):127-128; 1976.

1785 EFFECT OF ANALGESIC AGENTS ON EMPTYING OF THE GALLBLADDER IN MAN. (Eng.) Sacchetti, G.; Roncoroni, L.; Mandelli, V.; *et al.* (Dept. Medicine, Carlo Erba, Milan, Italy). *Eur. J. Clin. Pharmacol.* 10(2):127-131; 1976.

1786 STUDIES ON INTRAVENOUS ANESTHESIA. XXV. EFFECTS OF VARIOUS INTRAVENOUS ANESTHETICS ON THE MOTILITY OF HUMAN SMALL INTESTINE. (Jpn.) Namiki, A. (Sapporo Medical Coll. Hosp., Sapporo, Japan). *Jpn. J. Anesthesiol.* 25(5):465-477; 1976.

See also, 1864, 1979, 2054, 2056, 2059, 2075, 2164, 2183, 2270, 2500, 2586.

SECRETION AND METABOLISM

1787 ENZYMATICALLY IODINATED HUMAN SALIVARY PROTEINS: FRACTIONATION AND CHARACTERIZATION BY COLUMN CHROMATOGRAPHY AND ELECTROFOCUSING. (Eng.) Sarimo, S. S.; Tenovuo, J. (Dept. Biochemistry, Univ. Turku, SF-20500 Turku 50, Finland). *Biochem. J.* 167(1):23-29; 1977.

Enzymically [^{125}I]iodinated human salivary proteins were analyzed by diethylaminoethane (DEAE)-cellulose chromatography, column electrofocusing, and thin-layer polyacrylamide-gel (flat-bed) electrofocusing. The salivary proteins were enzymically iodinated by the ^{125}I-lactoperoxidase system. Salivary proteins were found to differ in their susceptibility to iodination carried out by this enzymic method. Two major iodine-binding protein fractions were discovered; one behaved like serum albumin on electrofocusing and was most susceptible to iodination by lactoperoxidase, and the other had pI characteristics similar to those of salivary amylase. The results suggest that iodoproteins may occur in human saliva. The significance of these iodoproteins may be related to the nonthyroidal metabolism of iodine.

1788 GLYCOPROTEIN SECRETION IN THE MOUSE SUBMANDIBULAR GLAND AS REVEALED BY RADIOAUTOGRAPHY AFTER L-^{3}H-FUCOSE INJECTION. (Eng.) Lima, T. G.; Haddad, A.; Fava-de-Moraes, F. (Instituto de Ciencias Biologicas, Universidade Federal de Minas Gerais, Caixa Postal 2486, 30000 Belo Horizonte/MG, Brazil). *Cell Tissue Res.* 183(4): 519-530; 1977.

Glycoprotein secretion was investigated by light microscope radioautography of semi-thin sections of the mouse submandibular gland after the administration of L-^{3}H-fucose (0.5 mCi, i.v.). The incorporation of the precursor in the acini was negligible. ^{3}H-fucose was taken up in the paranuclear region of the cells lining the intercalated, secretory, striated, and excretory ducts. This labeling pattern was interpreted as addition of the precursor to glycoproteins within the Golgi apparatus. Incorporation in the intercalated duct was restricted to the cells with fine cytoplasmic granules. The glycoproteins synthesized by the intercalated and secretory ducts were transported to the saliva by the secretion granules. It is assumed that the glycoproteins synthesized in the striated and excretory ducts are plasma membrane glycoproteins, which seem to renew continuously. Quantitation of the radioautographs supplied data concerning the incorporation of ^{3}H-fucose into newly synthesized glycoproteins as well as the renewal of the labeled macromolecules in each duct.

1789 INFLUENCE OF FOOD ON THE EFFECT OF 1-HYOSCYAMINE AND BENZILONIUMBROMIDE [Abstract]. (Eng.) Post, C.; Walan, A. (Dept. Clinical Pharmacology, Linkoping, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):72; 1977.

1790 EFFECTS OF VAGOTOMY ON THE STRUCTURE AND FUNCTION OF THE PARIETAL CELLS IN CATS [Abstract]. (Eng.) Helander, H. F.; Svensson, S. O.; Emas, S. (Dept. Anatomy, Univ. Lund, Lund, Sweden). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):483-484; 1977.

1791 VIP INFUSION IN MAN [Abstract]. (Eng.) Bloom, S. R.; Mitchell, S. J.; Domschke, S.; Domschke, W.; Mitznegg, P.; Lux, G.; *et al.* *Gut* 18(11):A963; 1977.

See also, 1743, 1973, 2318, 2319, 2605.

SECRETION AND METABOLISM

Stomach

1792 CYCLIC AMP AND CYCLIC GMP LEVELS IN GLANDULAR STOMACH OF RESTRAINED RATS. (Eng.) Zarrindast, M. R.; Sharghi, G.; Gerayesh-Nejad, S.; Djahanguiri, B. (Sch. Medicine, Univ. Tehran, Tehran, Iran). *Res. Commun. Chem. Pathol. Pharmacol.* 18(2):373-376; 1977.

Cyclic AMP and cyclic GMP were measured in the glandular stomach of Sprague-Dawley rats subjected to saline administration, cold (4 C), restraint, and restraint plus cold stress after 15, 30, 60, 90, and 120 min to determine the possible relationship between cyclic nucleotides and the development of stress ulcers. All animals subjected to restraint plus cold had gastric ulceration after 2 hr. A significant but transient decrease in cyclic AMP was observed 15 min after restraint plus cold. A marked, sustained and significant decrease of cyclic GMP was observed in the same group of animals. It seems unlikely that there is a correlation between cyclic AMP and cyclic GMP changes of the stomach and restraint-induced gastric ulceration.

1793 EFFECT OF ACETYLSALICYLIC ACID ON THE AMPHIBIAN GASTRIC MUCOSA. I. ELECTROPHYSIOLOGICAL AND PERMEABILITY CHANGES. (Eng.) Spenney, J. G.; Bhown, M. (Dept. Medicine, Univ. Alabama in Birmingham, Birmingham, AL 35294). *Gastroenterology* 73(4):785-789; 1977.

To study mechanisms by which aspirin alters ion transport in the stomach, electrophysiological and permeability changes were studied in the *in vitro* bullfrog gastric mucosa after an exposure of 10 or 20 mM acetylsalicylic acid. The potential difference and resistance rose initially. After 15 to 30 min of exposure, the potential difference declined to zero. Transmucosal resistance remained elevated considerably longer, but began to decline toward zero after 30-60 min of exposure. Mucosal permeability to mannitol increased as transmucosal resistance declined, but was not markedly elevated until the second hour of exposure to acetylsalicylic acid. The initial rise of potential difference was associated with inhibition of H^+ secretion, whereas the later decline of potential difference was due to inhibition of Cl^- transport. The abolition of short circuit current could not be attributed to mucosal to serosal flux of acetylsalicylate.

1794 EFFECT OF ACETYLSALICYLIC ACID ON GASTRIC MUCOSA. II. MUCOSAL ATP AND PHOSPHOCREATINE CONTENT, AND SALICYLATE EFFECTS ON MITOCHONDRIAL METABOLISM.

(Eng.) Spenney, J. G.; Brown, M. (Dept. Medicine, Univ. Alabama, University Station, Birmingham, AL 35294). *Gastroenterology* 73(5):995-999; 1977.

The effects of acetylsalicylic acid on gastric mucosal ATP, phosphocreatine, and O_2 consumption were studied *in vitro* in the bullfrog gastric mucosa. Potential difference and resistance changed rapidly after exposure to 10 or 20 mM acetylsalicylic acid at pH 3.0, 4.0, or 6.0 in the mucosal solution. ATP and phosphocreatine content decreased rapidly after exposure. Control mucosae contained 11.8 ± 0.98 nmol ATP and 11.5 ± 0.68 nmol of phosphocreatine per mg of protein. ATP content decreased by 21% and phosphocreatine by 45% after 15-30 min of exposure. Longer durations of exposure reduced both ATP and phosphocreatine levels to 10-15% of the controls. Oxygen consumption was increased during the first 15-30 min after exposure to acetylsalicylate. Longer durations of exposure reduced O_2 consumption to near control levels. Acetylsalicylate itself did not significantly affect mitochondrial respiration, respiratory control ratio, or ADP:O ratio. Salicylate had a biphasic effect that was concentration-dependent. Salicylate initially stimulated and later inhibited mitochondrial respiration. Using various substrates, the site of inhibition appeared to be located in the segment of the respiratory chain between coenzyme Q and cytochrome c_1. It is proposed that acetylsalicylate-induced mucosal injury includes absorption by diffusion from the acid contents of the lumen. Intracellularly, acetylsalicylic acid is hydrolyzed by an esterase to yield salicylate in sufficient concentration to uncouple and/or inhibit mitochondrial oxidative phosphorylation. As a result, ATP and phosphocreatine content decline, and many synthetic and transport activities cease.

1795 EFFECTS OF PROLONGED METIAMIDE MEDICATION ON THE FUNDIC MUCOSA: A SECRETORY AND HISTOMORPHOMETRIC STUDY IN THE RAT.

(Eng.) Witzel, L.; Halter, F.; Olah, A. J.; Hacki, W. H. (Inselspital, CH-3010 Berne, Switzerland). *Gastroenterology* 73(4):797-803; 1977.

Secretory and histomorphometric studies were carried out to determine the effect of long-term metiamide treatment on the parietal cell mass. Two groups of 10 rats each were treated with metiamide (200 mg/kg, s.c.) or with saline (0.15 M, 2 ml/kg, s.c.) at 8-hr intervals over 18 days. Eight hours after cessation of the treatment, basal secretion was not significantly altered, except for increased H^+ concentration in the metiamide group. Pentagastrin stimulation led to a significant rise in gastric juice volume (+18%), H^+ concentration (+50%), and acid output (+27%). In saline-treated controls no changes were observed. In the fundic mucosa, there was a significant increase in total number (+15%), total volume (+29%), and volume density (+11%) of parietal cells. These changes were attributable to increased volume of the individual parietal cell (+13%) and to increased fundic mucosal volume (+18%). Stimulated acid output correlated closely with both the total number and total volume of parietal cells. In an additional group of 10 rats, the mean serum gastrin levels rose significantly 2 hr after a single injection of metiamide (200 mg/kg, s.c.) in fasted and nonfasted conditions. It is concluded that in the rat prolonged administration of metiamide induces hypertrophy of the parietal cells, probably via hypergastrinemia, and leads to gastric hypersecretion after discontinuation of the medication.

1796 EFFECTS OF 7-OXA-13-PROSTYNOIC ACID (7-OPyA) AND PROSTAGLANDIN E_1 METHYL ESTER ON CANINE GASTRIC SECRETION.

(Eng.) Dajani, E. Z.; Driskill, D. R. (Dept. Biological Res., Searle Lab., P.O. Box 5110, Chicago, IL 60680). *Prostaglandins* 14(4):659-666; 1977.

The effects of 7-oxa-13-prostynoic acid (7-OPyA) on prostaglandin E_1 (PGE_1)-induced inhibition of gastric secretion were studied in unanesthetized dogs. Secretion was stimulated by the continuous i.v. infusion of histamine (1.0 mg/hr). At the steady-state plateau of gastric secretion, PGE_1 methyl ester (PGE_1 ME, 1.0 µg/kg/min) or PGE_1 ME and 7-OPyA (20-50 µg/kg/min) were simultaneously infused i.v. The extent of gastric secretory inhibition afforded by PGE_1 ME alone or in the presence of 7-OPyA was assessed. 7-OPyA did not modify PGE_1 ME gastric antisecretory actions when administered at doses 20-50 times greater than the dose of PGE_1 ME. These results suggest that the prostaglandin antagonist effects of 7-OPyA show organ specificity, which finding may be of clinical importance.

1797 ANTROPYLORIC G-CELL HYPERPLASIA IN HYPERCALCEMIC RABBITS BEARING THE VX_2 CARCINOMA

(Eng.) Dayal, Y.; Voelkel, E. F.; Tashjian, A. H., Jr.; DeLellis, R. A.; Wolfe, H. J. (New England Medical Center Hosp., 171 Harrison Ave., Boston, MA 02111). *Am. J. Pathol.* 89(2):391-400; 1977.

The distribution and the numbers of G cells in the gastric antropyloric region of hypocalcemic rabbits bearing the VX_2 carcinoma were mapped employing immunoperoxidase localization and morphometric quantitation and compared with that in the normal rabbit stomach. In normal animals, G cells were confined to the lower third of the antropyloric mucosa, where they were randomly distributed within the mucosal glands. In contrast, tumor-bearing animals showed an extension of these cells into the middle third of the antropyloric mucosa. The absolute counts of G cells in control rabbits were 5.3 ± 0.78 per unit area, while those in hypercalcemic tumor-bearing rabbits were 11.9 ± 0.46 per unit area ($p<0.05$). It is concluded that rabbits bearing the VX_2 carcinoma have G-cell hyperplasia.

1798 LOCALIZATION OF GASTRIN RECEPTORS IN INTACT ISOLATED AND SEPARATED RAT FUNDIC CELLS. (Eng.)

Soumarmon, A.; Cheret, A. M.; Lewin, M. J. M. (Hopital Bichat, 170 Boulevard Ney, Paris 75018, France). *Gastroenterology* 73 (4):900-903; 1977.

The cellular localization of previously described "high affinity" receptor sites ($K=0.60-0.80\ 10^{-8}$) for gastrin in purified plasma membranes from rat fundic mucosa was investigated. Dispersed rat fundic cells were prepared by pronase dissociation. Populations of 10% to 70% "large cells" (i.e., parietal cells) were obtained by successive 100 x *g* 45-sec centrifugations. Of the cells, 93 ± 5% excluded trypan blue; oxygen consumption ranged from 3.5 (10% large cells) to 15 nmol O_2/min/10^6 cells (70% large cells); cell ultrastructural integrity was well preserved. ^{3}H-labeled G17-I binding to isolated cells was temperature-dependent, proportional to cell concentration, reversible, and a saturable process as a function of time and hormone concentration. Association and dissociation rate constants were $K_1=0.69 \times 10^7$/M/min and $K_{-1}=0.063$/min, resp., at 20 C, pH 7.4. A Scatchard plot of the binding suggested a single class of binding sites with an equilibrium constant $K=0.90 \times 10^{-8}$ M and a maximum binding capacity of 7,500 sites per cell (crude suspension). Binding increased linearly as a function of the enrichment in parietal cells, the theoretical maximum binding capacity (100% parietal cell population) being 14,000 to 19,000 sites per cell. These findings on intact fundic cells compare favorably with those previously found on their derived plasma membranes. It is therefore suggested that, in the rat, parietal cells contain the high affinity gastrin receptors.

1799 THE GASTRIN-PRODUCING CELLS IN TISSUE CULTURES OF THE RAT PYLORIC ANTRUM. (Eng.)

De Schryver-Kecskemeti, K.; Greider, M. H.; Saks, M. K.; Rieders, E. R.; McGuigan, J. E. (Div. Surgical Pathology, Washington Univ., St. Louis, MO 63110). *Lab. Invest.* 37(4):406-410; 1977.

Tissue culture methods for the study of gastrin-producing cells isolated from the pyloric antral mucosa of male Wistar rats are described. Gastrin cell cultures were maintained for up to 7 days, with the largest number of well-defined cells seen on days 3 and 4. Gastrin cells were identified by means of immunofluorescent and unlabeled antibody-enzyme techniques. The tissue culture medium was monitored for basal gastrin secretion. In addition, stimulation of gastrin release was achieved by the use of dibutyryl cyclic-AMP and theophylline. The fact that gastrin cell cultures responded specifically and repetitively to stimulation supports the conclusion that this tissue culture approach maintains functional integrity of the gastrin cell and may be used to study the regulatory mechanism of gastrin secretion.

1800 STRUCTURE-FUNCTION RELATIONSHIPS OF PEPTIDE FRAGMENTS OF GASTRIN AND CHOLECYSTOKININ. (Eng.)

Kaminski, D. L.; Ruwart, M. J.; Jellinek, M. (Saint Louis Univ. Sch. Medicine, St. Louis, MO 63104). *Am. J. Physiol.* 233(4):E286-E292; 1977.

The structure-function relationships of the C-terminal peptide fragments of gastrin and cholecystokinin (CCK) were evaluated in the canine biliary system and the stomach. Dogs with chronic biliary and gastric fistulas were used. The administration of the common fragments of cholecystokinin (CCK) and gastrin with four and five amino acids and the active fragments of CCK with six through eight amino acids without sulfation of tyrosine in position 7 failed to alter hepatic bile flow from control values, while they significantly stimulated gastric hydrogen ion output. The administration of the seven and eight amino acid peptide fragments of CCK with sulfation of tyrosine in position 7 significantly increased hepatic bile flow. The administration of the sulfated octapeptide with 4 μg/kg/hr of nonsulfated octapeptide did not result in the inhibition of the choleresis produced by the sulfated peptide. The gastric hydrogen ion response produced by the administration of the nonsulfated and sulfated peptide was equal to that of the nonsulfated peptide alone. These results suggest that in the biliary system the receptor is highly specific as sulfation of the peptide fragment of CCK is essential for combining with the receptor, whereas in the stomach the receptor has little specificity and combines with all of the peptide fragments evaluated.

1801 RELEASE OF ANTRAL AND DUODENAL GASTRIN IN RESPONSE TO AN INTESTINAL MEAL. (Eng.)

Llanos, O. L.; Villar, H. V.; Konturek, S. J.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *Ann. Surg.* 186(5): 614-618; 1977.

The release of antral and duodenal gastrin was studied during the intestinal phase of gastric secretion, and the influence of the pH of the meal and of the antrum on the release of antral and duodenal gastrin was investigated. In dogs prepared with isolated, innervated antral pouches, intraduodenal perfusion with liver extract at pH 7, with the antrum buffered at pH 7, resulted in a significant release of gastrin selectively from the antrum (from 118 ± 13 pg/ml to 261 ± 58 pg/ml) and from the duodenum (124 ± 25 to 404 ± 100 pg/ml). Acidification of the meal to pH 1 abolished both antral and duodenal gastrin release, whereas acidification of the antrum abolished only the antral gastrin response. After antrectomy, liver extract at pH 7 caused a diminished but significant release of duodenal gastrin. These studies indicate that an intestinal meal may release (in addition to a specific intestinal phase hormone) gastrin from the intestine and from antrum, by means of a pH-sensitive mechanism that may involve a humoral agent from the small bowel.

1802 STIMULATION OF GASTRIN RELEASE AND GASTRIC SECRETION BY AMINO ACIDS BATHING PYLORIC GLAND AREA.

(Eng.) Konturek, S. J.; Tasler, J.; Cieszkowski, M.; Dobrzanska, M.; Wunsch, E. (Medical Acad., Krakow, Poland). *Am. J. Physiol.* 233 (3):E170-E174; 1977.

The potency of L- and D-isomers of 18 natural amino acids (AA) bathing the pyloric gland area in stimulating gastrin release and gastric acid secretion was compared in three dogs with denervated antral (AP) and Heidenhain pouches (HP) and gastric fistulas (GF). L-isomers of all natural AA stimulated acid secretion from the HP, whereas D-isomers were significantly less effective. The most potent L-isomers of AA were phenylalanine, alanine, and glycine, which caused an increase in acid output reaching 36%, 29%, and 26%, resp., of the maximal response to histamine (MRH). The strongest stimulants of acid secretion were relatively weak releasers of gastrin. Irrigation of the AP with increasing concentrations of L-phenylalanine (0.1-0.8 M), liver extract (2.5-20%), and acetylcholine (0.1-0.8%) resulted in a stepwise increase in acid reaching 31%, 22%, and 12% of the MRH, resp. Three gastrin peptides (G-14, G-17, and G-34), infused in graded doses (6.2-100 pmol/kg/hr), produced a dose-related increase in acid output, reaching 25%, 17%, and 17%, resp., of the MRH. The increment in serum gastrin was also dose-related and similar with G-14 and G-17 administration but significantly higher with G-34 administration. All L- and, to a lesser degree, D-isomers of natural AA bathing the pyloric gland area caused stimulation of gastric acid secretion that can be only partially explained by release of the major gastrin peptides.

1803 OPPOSITE EFFECTS OF GASTRIN ON CELL PROLIFERATION IN THE ANTRUM AND OTHER PARTS OF THE UPPER-GASTROINTESTINAL TRACT IN THE RAT.

(Eng.) Casteleyn, P. P.; Dubrasquet, M.; Willems, G. (St. Pierre Hosp., Hoogstraat, 322, B 1000 Brussels, Belgium). *Am. J. Dig. Dis.* 22(9):798-804; 1977.

The effect of gastrin on DNA synthesis and mitotic activity in the mucosa of the upper gastrointestinal tract was examined by autoradiography in unanesthetized Wistar rats with a gastric fistula. Animals were killed at 4-hr intervals, after starting a 3-hr i.v. infusion with the lowest dose of gastrin provoking a maximal acid output. Tritiated thymidine was injected 1 hr before killing. Labeling and mitotic indices were estimated in the fundic, antral, duodenal, and jejunal mucosa. The proliferative activity in the fundic, duodenal, and jejunal glands was significantly increased 16 hr after gastrin administration. In the antral glands, however, a significant decrease in both labeling and mitotic indices was observed ($p<0.05$ and $p<0.01$, resp.). Rhythmic variations in proliferative activity were observed in the antral, duodenal, and jejunal mucosa in controls. They were different from those in the gastrin-treated animals. The data confirm the trophic action of gastrin in the fundic, duodenal, and jejunal mucosa. They also indicate an inhibitory effect of this hormone on cell proliferation in the antral mucosa.

1804 THE EFFECT OF ATROPINE ON ACID SECRETION STIMULATED BY ACETYLCHOLINE, HISTAMINE AND GASTRIN IN THE ISOLATED WHOLE STOMACH OF THE RAT.

(Eng.) Bunce, K. T.; Marsh, G. F.; Parsons, M. E. (Smith Kline and French Lab. Ltd., Welwyn Garden City, Hertfordshire, England). *Br. J. Pharmacol.* 61(2):279-284; 1977.

Isolated stomach preparations from immature rats were used to study the effect of atropine on gastric acid secretion stimulated by histamine, gastrin, and acetylcholine. The acid secretory response to acetylcholine was not inhibited by 0.3 μM atropine. Atropine at 1 to 3 μM produced a measurable inhibition of acid secretion, and atropine at 10 μM caused a complete block of acid secretion, which could not be surmounted by high concentrations of acetylcholine (3-10 mM). The acid secretory response to histamine was not inhibited by concentrations of up to 1 mM of atropine. Atropine concentrations of 1 μM and 10 μM did not inhibit gastrin-stimulated acid secretion, although a significant inhibition of acid output was observed at atropine concentrations of 0.1 mM and 1 mM.

1805 DUODENAL ULCEROGENS, CYSTEAMINE AND PROPIONITRILE, STIMULATE SERUM GASTRIN LEVELS IN THE RAT.

(Eng.) Lichtenberger, L. M.; Szabo, S.; Trier, J. S. (Univ. Texas Medical Sch., P.O. Box 20708, Houston, TX 77025). *Gastroenterology* 73(6):1305-1308; 1977.

To determine the role of gastrin in the mechanism by which cysteamine and propionitrile induce duodena ulcer formation, these drugs were administered to fasted female Sprague-Dawley rats, and their effect on fasting and food-stimulated serum gastrin levels was studied. Intragastric administration of cystea mine (28 mg/100 g) caused a three- to fourfold increase in fasting serum gastrin levels over the val ues of controls. Propionitrile (6-12 mg/100 g) was a less effective stimulant of gastrin release, causing a 1.5- to 2-fold increase in gastrin levels over matched controls. The food-stimulated rise in serum gastrin levels after either a chow meal or intragastric instillation of a peptone solution was markedly enhanced by cysteamine pretreatment. Three hours after feeding, the serum gastrin levels of cysteamine-pretreated rats were six times higher than those of fed controls. The high serum gastri levels of cysteamine-pretreated fed rats could not be explained solely by the additive effects of cysteamine and food, indicating that a potentiating interaction may exist between the two stimulants of gastrin release. The importance of this drug-induced stimulation of gastrin release, under both fasted and fed conditions, in the ulcerogenic process has yet to be ascertained.

1806 ON THE CAUSE OF THE INCREASED HEIDENHAIN POUCH SECRETION AND SERUM GASTRIN CONCENTRATION AFTER GASTROJEJUNOSTOMY IN DOGS: WITH A STATISTICAL APPENDIX.

(Eng.) Rokkjaer, M.; Host, V.; Brandsborg, O.; Brandsborg, M.; Lovgreen, N. A. (Kommunehospitalet, DK-8000 Aarhus C, Denmark). *Gastroenterology* 73(5):1065-1071; 1977.

The possible importance of reduced duodenal inhibition of gastric acid secretion, reflux or regurgitation of alkaline duodenal contents, gastric stasis resulting from gastrin release, and increased intestinal stimulation of gastric secretion in the increased Heidenhain pouch (HP) secretion seen after gastrojejunostomy (GEA) in dogs was investigated. In 10 dogs with HP, a GEA was constructed and later converted into a Roux-en-Y anastomosis to abolish or reduce trans-stomal reflux. Next, duodenal inhibition was abolished by duodenal transection, and finally the duodenal bulb was excised. The 24-hr HP acid output increased after GEA, some 70% of the increase being attributable to trans-stomal reflux, the rest to decreased duodenal inhibition. Abolished duodenal inhibition caused a new rise, not significantly different from that caused by the combined effect of reflux, and decreased duodenal inhibition after GEA. The 24-hr fasting HP acid output and 5-hr food-stimulated HP acid output rose after GEA by the same amount as that caused by abolished duodenal inhibition. A significant correlation was found between integrated gastrin and total HP acid output after food stimulation. Both fasting and food-stimulated gastrin concentration rose after GEA, the latter caused by reflux alone. Elimination of duodenal inhibition caused an unexpected rise in both fasting and food-stimulated gastrin concentration.

1807 EFFECT OF MULTIPLE-STRESS PROCEDURES ON MONKEY GASTRODUODENAL MUCOSA, SERUM GASTRIN, AND HYDROGEN ION KINETICS.

(Eng.) Natelson, B. H.; Dubois, A.; Sodetz, F. J. (New Jersey Medical Sch., 88 Ross St., East Orange, NJ 07018). *Am. J. Dig. Dis.* 22(10):888-897; 1977.

The effect of frequently changing and stressful performance demands on the condition of the gastroduodenal mucosa, the serum gastrin level, and H^+ kinetics was studied in rhesus monkeys. By arranging a series of psychological contingencies (unpredictability, uncontrollability, conflict), coupled with delivery of a physical stimulus (electric shock), gastroduodenal mucosal lesions were produced in seven of eight monkeys. The most severe conflict paradigm most consistently produced lesions across subjects. Of the 30 lesions observed by endoscopy, 80% occurred near the anatomic junction of gastric body and antrum, in the antrum, or in the duodenum. Lesions varied in severity from discolorations of the mucosa to disruptions of mucosal integrity. Gastric lesions generally disappeared in several days, despite the continuation of stress; some duodenal lesions were equally evanescent, but in two monkeys, lesions lasted over 1 week. Hydrogen ion kinetics were measured in two monkeys that developed gastric lesions and two that developed duodenal lesions. The rate at which hydrogen ion entered the duodenum was uniformly suppressed for all four monkeys during their first session of shock avoidance; during their last session, the gastric subgroup continued to show suppression while the duodenal subgroup returned towards control levels. Serum gastrin levels were unchanged by the multiple stress procedures. The finding of consistently producible, stress-induced gastroduodenal pathology in anatomic areas similar to those involved in man suggests that the subhuman primate is suitable for further efforts to produce an animal model of psychosomatic ulcer disease.

1808 EFFECTS OF FASTING AND PENTAGASTRIN ON PROTEIN SYNTHESIS BY ISOLATED GASTRIC MUCOSAL RIBOSOMES IN A CELL-FREE SYSTEM.

(Eng.) Nandi Majumdar, A. P.; Goltermann, N. (Inst. Medical Biochemistry, Univ. Aarhus, DK-8000 Aarhus C, Denmark). *Gastroenterology* 73(5):1060-1064; 1977.

Gastric mucosal polyribosomes, isolated from fasted, fed, and pentagastrin-treated fasted rats were studied for their ability to support protein synthesis in a cell-free system. Groups of Wistar rats were either fed *ad libitum* or fasted for 48 hr, and pentagastrin (500 μg/kg) was then injected to one fasted group, while the other fasted and fed groups received 0.9% saline. Liver cell sap, prepared from normal fed rats was used as a source for activating enzymes in the cell-free systems. The rate of [^{14}C]amino acid incorporation into protein by gastric mucosal polyribosomes from nonfasted and pentagastrin-injected rats was considerably higher than that of the fasted control. One hour after the hormone injection, ribosomal protein synthesis was 40% higher than in the control. However, 1.5 and 6 hr after the hormone treatment, the increments were 22% and 15% above the respective controls. A prolongation of the fasting period itself from 48 to 54 hr caused a 7% reduction in ribosomal protein synthesis. The protein to phenylalanine ratio, which represents a ratio of polysomes to monosomes, was 100% above the fasted controls 1 hr after pentagastrin injection. In the absence of polyuridylic acid [poly(U)], the incorporation of [^{14}C]phenylalanine into protein by polyribosomes from the pentagastrin-injected rats was 65% higher than the fasted control, whereas in the presence of poly(U), the control ribosomes showed a 20% increased incorporation. Polyphenylalanine synthesis by the control ribosomes was also 30% above the hormone-treated group. The more active response of the control ribosomes to poly(U) may be attributable to the presence of a higher proportion of monosomes in the preparation.

1809 EFFECT OF METHACHOLINE ON ACID AND PEPSIN RESPONSES TO PENTAGASTRIN IN CATS WITH INNERVATED AND DENERVATED FUNDIC POUCHES.

(Eng.) Svensson, S. O.; Dubrasquet, M.; Emas, S. (Karolinska Sjukhuset, Stockholm, Sweden). *Surgery* 82(5): 580-587; 1977.

The effect of threshold dose of methacholine (15 or 20 μg/kg/hr, i.v.) on gastric secretion stimulated by pentagastrin (PG) was studied in four cats with Pavlov pouches (PP) and in four with Heidenhain pouches (HP). In the PP group, methacholine did not alter either the maximal response (MR) or the dose producing half of the maximal response (D_{50}) for PG. In the HP group, the highest acid response to PG combined with methacholine was greater than the MR to PG alone. Methacholine decreased the D_{50} for PG in the HP group to that in the PP group with and without methacholine ($p<0.001$ and $p<0.05$, resp.). Methacholine increased the pepsin response to all doses of PG both in the PP ($p<0.001$) and the HP groups ($p<0.05$ to $p<0.001$). The effect was more pronounced in the HP group. In both types of pouches, the percentage increase of pepsin secretion was larger at low than at high doses of PG. Methacholine increased the pepsin/acid (P/A) ratio for PG in the HP group to that in the PP group with and without methacholine. Accordingly, methacholine sensitized the oxyntic glands and increased the pepsin response to PG in the HP group as did basal vagal tone in the PP group. Methacholine did not further sensitize the innervated oxyntic glands to gastrin but increased the response of the peptic glands. It is concluded that a threshold dose of methacholine produces equal sensitization of the oxyntic cells to PG in the HP as basal vagal tone in the PP but produces no further sensitization in the PP. A threshold dose of methacholine increases the acid secretory capacity only in the HP. The pepsin responses of the PP and HP to various doses of PG are increased by a threshold dose of methacholine, which also mimics basal vagal tone by increasing the P/A ratio for PG in the HP to that in the PP.

1810 COMPARISON OF THE INHIBITION OF HISTAMINE- AND PENTAGASTRIN-STIMULATED GASTRIC ACID SECRETION BY SOMATOSTATIN IN THE CAT.

(Eng.) Albinus, M.; Reed, J. D.; Gomez-Pan, A.; Schally, A. V.; Coy, D. H. (Dept. Pharmacology, Univ. Tubingen, Tubingen, W. Germany). *Agents Actions* 7(5/6):501-506; 1977.

The inhibitory effect of cyclic somatostatin on pentagastrin- and histamine-stimulated gastric acid secretion in normal and vagotomized gastric fistula cats was investigated. Histamine dose-response curve experiments in cats with intact vagus nerves showed that at low doses of histamine, 4 or 10 μg/kg/hr of somatostatin produced a significant reduction in gastric acid output, and at any one dose of histamine, this inhibition was somatostatin dose-dependent. However, as the dose of histamine was increased to produce maximum gastric secretory rates, neither 4 nor 10 μg/kg/hr of somatostatin produced inhibition of gastric acid output. The result was a dose-response curve converging with no inhibition at a histamine dose of 250 μg/kg/hr. The infusion of somatostatin (10 μg/kg/hr) during stimulation of gastric acid secretion by pentagastrin (8 μg/kg/hr) in cats with intact vagus nerves resulted in rapid inhibition of gastric acid secretion that reached 95% in the last 30 min of the somatostatin infusion. Following the end of this infusion, the gastric acid secretion rapidly returned to control values. With pentagastrin stimulation, somatostatin produced parallel displacement of the dose-response curves. It is suggested that somatostatin competitively inhibits pentagastrin-stimulated gastric acid secretion, whereas it inhibits histamine-stimulated secretion by a mechanism that is not competitive in nature. The vagus nerves seem to be involved in the mode of action of somatostatin, since the inhibitory effects of somatostatin were greater in vagotomized than in vagus-intact animals.

1811 ELECTRICAL EVENTS DURING ACTIVATION AND INHIBITION OF GASTRIC HCl SECRETION.

(Eng.) Rehm, W. S.; Sanders, S. S. (Medical Center, Univ. Alabama in Birmingham, University Station, Birmingham, AL 35294). *Gastroenterology* 73(4): 959-969; 1977.

Some of the relationships between the secretory rate and the electrophysiological characteristics of the canine and frog gastric mucosa are reviewed. There is no simple relationship between the potential difference (PD) and H^+ rate in the *in vitro* frog gastric mucosa with standard Cl^- bathing solutions. In contrast, with Cl^--free solutions (PD is inverted), there is a precise linear relation between the PD and the H^+ rate. This linear relationship strongly supports the concept that the H^+ mechanism under these conditions is electrogenic. In the past, it has been difficult to exclude the possibility that the inverted PD is due to a liquid junction potential between acid fluid in the lumina and the secretory bathing solution. The use of aminopyrine or imidazole essentially eliminates the possibility that the inverted PD is due to a liquid junction potential. Hence, the linear relationship is solid evidence for the electrogenicity of the H^+ mechanism. Recently, aminopyrine and imidazole have been shown to reverse thiocyanate inhibition of H^+ secretion.

1812 ABSOLUTE DEPENDENCE ON CHLORIDE FOR ACID SECRETION IN ISOLATED GASTRIC GLANDS.

(Eng.) Berglindh, T. (Biomedical Center, Univ. Uppsala, P.O. Box 572, S-751 23 Uppsala, Sweden). *Gastroenterology* 73(4):874-880; 1977.

To gain information concerning the nature of chloride transport and its interactions with H^+ secretion in the mammalian parietal cell, the behavior of isolated rabbit gastric glands in chloride-free solutions was studied. The glands lost their ability to accumulate H^+ ions when incubated in Cl^--free solutions, as measured by accumulation of the weak base aminopyrine (AP). Simultaneously, basal oxygen consumption was significantly increased (+56%). Addition of histamine or dibutyryl cyclic AMP (db-cAMP) further increased the respiration, but only a minor increment in the AP accumulation was seen. Addition of Cl^- dose-dependently increased he AP accumulation back to normal basal values, function that was coupled with a progressive lecrease in oxygen consumption down to the normal evel. ED_{50} for AP accumulation was 15.0 mM Cl^-. CN^- also decreased the respiratory rate, but did ot restore AP accumulation. Increasing the K^+ oncentration of the Cl^--free solution 10-fold did ot affect the AP ratio per se, but facilitated he rise in AP accumulation upon addition of Cl^-. t standard Cl^- concentrations the final AP ratio as significantly increased above that of glands ncubated at normal K^+ concentrations. The addiion of Br^- to the chloride-free medium induced esponses indistinguishable from those of Cl^-, hereas I^- showed less affinity and was inhibitory t higher concentrations (>20 mM). Studies on AP ccumulation kinetics showed that the addition of l^- to glands pretreated with db-cAMP did not inuce a more rapid accumulation than that seen in lands to which db-cAMP and Cl^- were added simulaneously. This might indicate that db-cAMP does ot induce a morphological transformation of the arietal cell into a secreting state in the absence f Cl^-. As one explanation for the results obtained, Cl^--HCO_3^- exchange mechanism in the secretory memrane is proposed, which implies that HCO_3^- handling the secretory membrane is impaired in the abence of Cl^- and that this could lead to a neutralzation of the H^+ ions formed.

13 EVIDENCE FOR A HISTAMINE H_2 RECEPTOR THAT INHIBITS PEPSIN SECRETION IN THE DOG.

ng.) Hirschowitz, B. I.; Hutchison, G. A. (Dept. edicine, Univ. Alabama, Birmingham, AL 35294). . *J. Physiol.* 233(3):E225-E228; 1977.

id and pepsin output were studied in four gastric stula dogs treated with histamine and in five gs treated with 4-methylhistamine [4(Me)H]. Each ine was given in 45-min incremental step doses constitute full dose-response curves (histamine: 5, 10, 20, 50, 100, and 150 µg/base/kg/hr; 4-thylhistamine: 1.5, 3.5, 7, 15, 35, 70, and 105 /kg/hr). Pepsin output was biphasic with both ugs. Peak pepsin output occurred at low doses 5 µg/kg/hr) and progressive inhibition of output s seen at higher doses, but H^+ output was stimated at all doses. Cimetidine (1 mg/kg/hr) comtitively inhibited H^+ stimulation. The pepsin sponse to histamine or 4(Me)H was converted to positive logsigmoid response when cimetidine s given at the same time. In the presence of metidine (1 mg/kg/hr), the outputs of H^+ and psin were positively correlated in the full stamine dose range. These data show that histane effects on pepsin secretion are a mixture stimulation and inhibition and that the recepr responsible for pepsin stimulation is of a gh affinity, low K_m, H_2 type, whereas inhibition high doses of histamine is probably mediated a low affinity, high K_m receptor, also H_2 type.

1814 EFFECT OF HISTAMINE RECEPTOR ANTAGONISTS ON BILE DAMAGE TO THE GASTRIC MUCOSA OF CANINE HEIDEHAIN POUCHES.

(Eng.) Rees, W. D. W.; Rhodes, J.; Wheeler, M. H.; Meek, E. M.; Williams, B.; Newcombe, R. G. (Univ. Hosp. Wales, Wales, Cardiff, Wales). *Gut* 18(10):821-826; 1977.

The effect of combined H_1 and H_2 histamine receptor antagonists (mepyramine maleate or metamide, resp.) on damage to the gastric mucosal barrier produced by sodium taurocholate was studied. Four mongrel dogs were prepared with gastric Heidenhain pouches two months before the experiment. Changes in the volume, ionic (H^+ and Na^+) concentrations and flux, and transmucosal potential difference were determined in three 30-min periods. In periods I and III, a standard acid solution was placed in a pouch, and in period II, bile (sodium taurocholate) was given. Dogs were also given i.v. injections of H_1 or H_2 receptor antagonists, alone or in combination (mepyramine maleate, 10 mg/kg during period I, or metamide, 200 µM/50 ml/hr throughout the experiment). In control experiments (normal saline, 50 ml/hr, i.v.), there was a small loss of the pouch fluid during period I, but the volume increased by 1.2 ml during period II ($p<0.01$); a small increase occurred in period III. There was a decrease in H^+ concentration, especially in period II (-4.7 µM/ml, $p<0.05$). An increase in Na^+ concentration was maximum in period II (+3.3 µM/ml, $p<0.025$). The changes in H^+ and Na^+ ion flux followed the pattern described for the changes in ion concentration. The transmucosal potential difference remained steady during period I (-43 mV); it decreased significantly in period II ($p=0.02$); and then increased during period III. Similar results were obtained when either H_1 or H_2 antagonists were given. The histamine content in pouch fluid was 0.030 µg/ml in controls and during period I; it increased to 0.066 µg/ml during period II. When H_1 and H_2 antagonists were given together, the comparable values were 0.055 µg/ml and 0.058 µg/ml, resp. The combined effect of H_1 and H_2 antagonists appears to reduce or abolish changes in the volume and ionic fluxes produced by sodium taurocholate. The results suggest that histamine mediates changes in the transmucosal ionic flux produced by bile acid.

1815 EFFECT OF ANTRECTOMY ON GASTRIC HYPERSECRETION INDUCED BY DISTAL SMALL BOWEL RESECTION.

(Eng.) Hall, A. W.; Moossa, A. R.; Wood, R. A. B.; Block, G. E.; Skinner, D. B. (Pritzker Sch. Medicine, Univ. Chicago, 950 E. 59th St., Chicago, IL 60637). *Ann. Surg.* 186(1): 83-87; 1977.

The mechanisms involved in the gastric hypersecretory response to distal small bowel resection were elucidated by studying the secretory profile, serial fasting serum gastrin, and gastric inhibitory polypeptide (GIP) in seven male Rhesus monkeys, with demonstrated gastric hypersecretory response to 50% distal small bowel resection. This increase in gastric acid output had persisted for more than 6 months. Precise, anatomical antrectomy without vagotomy was performed, and intestinal continuity restored by gastroduodenostomy. Complete abolition of basal acid secretion and of the secretory response to histamine occurred. These effects could not be reversed by continuous (5 hr) infusions of pentagastrin (0.2 μg/kg/hr or 2 μg/kg/hr). The dose response curve to gastrin pentapeptide was altered; maximum secretion was greatly reduced and occurred at 10 μg/kg/hr. Neither basal serum gastrin or basal serum GIP was significantly reduced by antrectomy. These findings indicate that, in this animal model, the antrum is essential in the genesis of the hypersecretory state. If these findings are relevant to man, precise antrectomy may be the procedure of choice for symptomatic acid hypersecretion after small bowel resection or disease.

1816 HISTOCHEMICAL LOCALIZATION OF ENZYMES IN THE NORMAL RAT GASTRIC MUCOSA USING THE TECHNIQUE OF THE SEMIPERMEABLE MEMBRANES AND THE OTHER METHODS. (Eng.) Zaviacic, M.; Brozman, M. (Medical Sch., Komensky Univ. Bratislava, Sasinkova 4, 80100 Bratislava, Czechoslovakia). *Acta Histochem. (Jena)* 57(2):270-281; 1976.

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1830 INTRAVENOUS ASPIRIN PLUS HISTAMINE PRODUCED DEEP ULCERS OF THE GASTRIC ANTRUM IN 36 HOURS IN CATS [Abstract]. (Eng.) Hansen, D. G.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1067; 1977.

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Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1095; 1977.

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1841 INHIBITION OF GASTRIC SECRETION BY ANTI-GASTRINIC AND H_2-BLOCKING AGENTS. (Eng.) Rovati, A. L. (Rotta Res. Laboratorium spa Monza San Fruttuoso, Milan, Italy). *Scand. J. Gastroenterol.* 11(Suppl. 42):113-118; 1976.

1842 CLINICAL PHARMACOLOGY AND THERAPEUTIC POTENTIAL OF H_2-RECEPTOR ANTAGONISTS. (Eng.) Misiewicz. J. J. *In: Topics in Gastroenterology.* Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications):(4): 309-328: 1976.

1843 INFLUENCE OF HISTAMINE RELEASING AGENTS ON GASTRIC ACID SECRETION OF ISOLATED BULLFROG GASTRIC MUCOSA. (Eng.) Goto, Y.; Watanabe, H. Y.; Watanabe, K. (Res. Inst. for Wakan-Yaku, Toyama Univ., Gofuku 3190, Toyama 930, Japan). *Jpn. J. Pharmacol.* 26(6):661-668; 1976.

1844 DIMAPRIT EVOKES HIGHER MAXIMAL RATES OF GASTRIC SECRETION THAN HISTAMINE [Abstract]. (Eng.) Carter, D. C.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1036; 1977.

1845 ADENYLATE CYCLASE OF HUMAN GASTRIC MUCOSA. STIMULATION BY HISTAMINE AND NON-HORMONAL ACTIVATORS [Abstract]. (Eng.) Simon, B.; Kather, H. (Medizinische Universitatsklinik, Heidelberg, W. Germany). *Acta Endocrinol. (Suppl.) (Kbh.)* 85 (Suppl. 212):196; 1977.

1846 INHIBITION OF GASTRIC SECRETION BY INTESTINAL HORMONES. (Eng.) Baron, J. H. (Royal Postgraduate Medical Sch., Hammersmith Hosp., London, England). *Scand. J. Gastroenterol.* 11 (Suppl. 42):17-24; 1976.

1847 THE ROLE OF CYCLIC NUCLEOTIDES IN CANINE GASTRIC ACID SECRETION [Abstract]. (Eng.) Thurston, D. (Dept. Medicine, Univ. Illinois, Chicago, IL). *Gastroenterology* 72(5, Part 2):1190; 1977.

1848 INHIBITION OF PENTAGASTRIN-STIMULATED SECRETION OF ACID AND PEPSIN BY TRIMIPRAMINE IN MAN. (Eng.) Berstad, A.; Roland, M.; Myren, J. (Aker Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 11(Suppl. 42):123-125; 1976.

See also, 1698, 1703, 1736, 1764, 1767, 1791, 1851, 1859, 1870, 1989, 1999, 2038, 2124, 2148, 2163, 2164, 2165, 2166, 2172, 2180, 2181, 2188, 2193, 2198, 2199, 2201, 2228.

SECRETION AND METABOLISM

Pancreas

1849 STUDIES OF THE SECRETORY PROCESS IN THE MAMMALIAN EXOCRINE PANCREAS. I. THE CONDENSING VACUOLES. (Eng.) Novikoff, A. B.; Mori, M.; Quintana, N.; Yam, A. (Albert Einstein Coll. Medicine, Yeshiva Univ., Bronx, NY 10461). *J. Cell Biol.* 75(1):148-165; 1977

Phosphatase cytochemistry was used to distinguish between the Golgi apparatus and the specialized region of endoplasmic reticulum at the inner (trans) aspect of the Golgi stack known as GERL, in pancreatic exocrine cells of guinea pig, rat, rabbit, and hamster. The trans element of the Golgi stack exhibited thiamine pyrophosphatase (TPPase) but no acid phosphatase (AcPase) activity. In contrast, GERL showed AcPase but no TPPase activity. The nascent secretory granules, or condensing vacuoles, were expanded cisternal portions of GERL. Continuities of condensing vacuoles with rough endoplasmic reticulum are suggested, and it is proposed that some secretory components may have direct access to the condensing vacuoles from endoplasmic reticulum. Connections of Golgi apparatus with GERL were not seen.

1850 INCORPORATION PATTERN OF L-, D-, AND DL-AMINO ACIDS INTO THE PANCREAS OF MICE. (Eng.) Goto, R.; Tezuka, M.; Tamemasa, O. (Shizuoka Coll. Pharmacy, 2-1, Oshika 2-chome, Shizuoka, Japan). *Chem. Pharm. Bull.* 25(7):1574-1581; 1977.

Comparative experiments were made on the *in vivo* incorporation of 18 kinds of ^{14}C-labeled L-amino acid, and of D- and DL-forms of four selected radioactive amino acids into the trichloroacetic acid (TCA)-soluble and protein fractions of the pancreas and liver of dd/Y mice to develop amino acid derivatives as new pancreas-scanning agents. Among the L-forms tested, tryptophan, valine, methionine, and leucine, in this order of decreasing incorporation, showed a relatively high incorporation into the pancreas 30 min after their i.v. injection. The pancreas/liver ratio of the radioactivity of methionine, valine, and leucine determined 15, 30, and 60 min after injection was 6:10. These three amino acids seem to be a possible mother compound for introducing γ-emitters as a pancreas-scanning agent. In the TCA-soluble fraction of the pancreas, the radioactivity of DL- or D-amino acids tested was higher than that of the corresponding L-amino acid. Almost all radioactivity of D-leucine was found in the TCA-soluble fraction. The incorporation of D-leucine into the pancreas was similar to that of L-leucine. These results suggest that γ-radiating derivatives of amino acids might be useful as new pancreas-scanning agents.

1851 IMMUNOHISTOCHEMICAL DEMONSTRATION OF GLUCAGON- AND GLI-CONTAINING CELLS IN THE CANINE GUT AND PANCREAS. (Eng.) Ito, S.; Kobayashi, S. (Niigata Univ. Sch. Medicine, Asahimachi-dori 1, Niigata, 951 Japan). *Arch. Histol. Jpn.* 39(3):193-202; 1976.

Cells with glucagon- and glucagon-like immunoreactivity (GLI) were studied by an indirect immunofluorescence technique in the normal canine gastrointestinal mucosa and pancreas. Glucagon immunoreactivity was demonstrated in the basal-granulated cells in the deeper portion of the fundic gland of the stomach as well as in the A cells of the pancreatic islet. GLI-positive basal-granulated cells were found in the gastric fundus, jejunum, ileum, and colon. These cells were not found in the pyloric antrum or duodenum. Careful examination of the immunofluorescence specimens indicated that essentially every GLI-positive cell in the gastric fundus and pancreas contained glucagon. The GLI-positive cells in the jejunum, ileum, and colon were the "open" type (i.e., reaching the lumen with their tapered luminal process), whereas the glucagon/GLI-positive cells in the stomach were "closed" (separated from the lumen by a layer of epithelial cells). Basal-granulated cells could receive information for their secretory activity from either the luminal or the serosal side of the gut mucosa.

1852 EFFECT OF ADRENOCORTICOTROPIC HORMONE ON PURE EXOCRINE PANCREATIC SECRETION IN MAN (Eng.) Gullo, L.; Costa, P. L.; Fontana, G.; Tessari, R.; Serra, D.; Labo, G. (Istituto di Clinica Medica e Gastroenterologia, Ospedale S. Orsola, 40138 Bologna, Italy). *Gastroenterology* 73(4, Part 1):763-764; 1977.

The effect of ACTH on pure exocrine pancreatic secretion was studied in seven patients with external transduodenal drainage of the main pancreatic duct performed after biliary tract surgery. The i.v. injection of ACTH (0.25 mg) during a prolonged i.v. infusion of secretin (0.5 clinical U/kg/hr) plus cholecystokinin (0.5 Ivy dog U/kg/hr) significantly reduced both the concentration and output of lipase (peak -41% and -41%, resp.) and of protein (-39% and -36%, resp.) without affecting volum and bicarbonate secretion. The reduction appeared soon after ACTH injection (peak inhibition in the first 15-min period) and lasted about 75 min. The adrenocortical response to ACTH reached its peak at the 60th min. The mechanism by which the pituitary hormone selectively inhibits pancreatic enzyme secretion without affecting volume and bicarbonate remains to be clarified.

1853 THE DEPENDENCE OF CAERULEIN-EVOKED PANCREATIC FLUID SECRETION ON THE EXTRACELLULAR CALCIUM CONCENTRATION. (Eng.) Ueda, N.;

Petersen, O. H. (Asahikawa Univ. Sch. Medicine, Asahikawa, Hokkaido, Japan). *Pfluegers Arch.* 370 (2):179-183; 1977.

Fluid and amylase secretion was measured in the perfused rat pancreas in the absence of and during cerulein or secretin stimulation. The removal of Ca^{2+} from the perfusion fluid only slightly reduced spontaneous fluid secretion, but caused a marked reduction in the amylase output. In experiments in which the CO$_2$/HCO$_3^-$ buffer had been replaced by tris buffer, removal of Ca^{2+} abolished spontaneous fluid and amylase secretion. Elimination of Ca^{2+} during continuous stimulation with cerulein (10^{-10} M) caused an immediate rapid reduction in fluid and amylase secretion, which was reversible upon readmission of Ca^{2+}. Removal of perfusion fluid Ca^{2+} and addition of ethylene glycol bis(β-aminoethyl ether)*N,N*-tetraacetic acid during secretin stimulation had no effect on fluid for the first 30 min after the start of Ca^{2+} deprivation. Thereafter, a gradual reduction in fluid flow occurred, which was nonreversible upon Ca^{2+} readmission. During stimulation with monobutyryl cyclic AMP, Ca^{2+}-deprivation failed to reduce fluid secretion within a 30-min period. Increasing the concentration of Ca^{2+} in the perfusion fluid to 20 mM during stimulation with cerulein caused a sharp reduction in fluid secretion and a small decrease in amylase output. These effects were partially reversible if the period of exposure to the high Ca^{2+} concentration was less than 20 min. It is concluded that extracellular Ca^{2+} is important for cerulein-evoked, but not for secretin-evoked, fluid secretion.

1854 EFFECT OF EXTRACELLULAR K$^+$ CONCENTRATION ON RESTING POTENTIAL, CAERULEIN-INDUCED DEPOLARIZATION AND AMYLASE RELEASE FROM MOUSE PANCREATIC ACINAR CELLS.

(Eng.) Poulsen, J. H.; Williams, J. A. (Panum Inst., Univ. Copenhagen, Blegdamsvej 3-C, DK-2200 Copenhagen N, Denmark). *Pfluegers Arch.* 370(2):173-177; 1977.

Studies were carried out to investigate the possible role of stimulation-induced depolarization in pancreatic enzyme secretion. Acinar cell membrane potentials and amylase release were measured from *in vitro* preparations of mouse pancreas. The effect of a 10-fold increase of the extracellular K$^+$ concentration (to 47 mM) was studied on the resting membrane potential and amylase release, as well as on the membrane depolarization and amylase release induced by cerulein. In the presence of atropine (to exclude the effect of a possible release of endogenous acetylcholine), the increased K$^+$ concentration depolarized the cells from -45 to -20 mV without influencing the rate of the unstimulated release of amylase. Under these conditions, the depolarizing effect of cerulein was almost abolished, while the cerulein-induced amylase was not. It is concluded that cerulein-induced enzyme secretion from pancreatic acinar cells is independent of the level of the membrane potential, as well as extracellular K$^+$ concentration, in the range from 4.7 to 47 mM.

1855 SECRETION OF PANCREATIC JUICE IN RESPONSE TO NERVOUS AND HORMONAL STIMULATION IN THE ANAESTHETIZED MONKEY (Erhythrocebus patas AND Papio mandrillus).

(Eng.) Vega, D. F.; Martinez-Victoria, E.; Esteller, A.; Murillo, A. (Dept. Animal Physiology, Univ. Granada, Spain). *Comp. Biochem. Physiol.* [*A*] 58(3A):259-264; 1977.

Exocrine pancreatic secretion was studied in two primate species *(Erythrocebus patas* and *Papio mandrillus).* The resting flow in *P. mandrillus* was high (33.0-86.0 µl/min) and contained a low concentration of amylase (2.73-3.43 U/ml). There was no resting secretion in *E. patas.* The i.v. infusion of secretin increased the flow of pancreatic juice in a dose-related manner in both species, the monkeys being highly sensitive to the hormone. In *E. patas,* a single injection or infusions of cholecystokinin-pancreozymin increased the flow and amylase content of the juice. Stimulation of the cervical vagus nerves increased the flow and amylase content of the juice in both species; there were wide differences between individuals of the same species as well as between species. Atropine reduced, but did not abolish the pancreatic response caused by vagal stimulation. In *E. patas,* the concentration of chloride ions fell when the flow of juice increased; in *P. mandrillus* the concentration remained constant at different rates of flow. These experiments show that there may be substantial differences in the properties of the exocrine pancreas between related primate species.

1856 PANCREATIC DUCT CELLS IN RATS: SECRETORY STUDIES IN RESPONSE TO SECRETIN, CHOLECYSTOKININ-PANCREOZYMIN, AND GASTRIN IN VIVO.

(Eng.) Folsch, U. R.; Creutzfeldt, W. (Dept. Medicine, Univ. Gottingen, Humboldtallee 1, D-3400 Gottingen, W. Germany). *Gastroenterology* 73(5): 1053-1059; 1977.

The sensitivity and secretory pattern of pancreatic duct cells to a variety of hormones was investigated in male Wistar rats that received a copper-deficient diet supplemented with D-penicillamine (300 mg/kg/day) for 100 days, a regimen that selectively destroys acinar tissue. Resting flow rate of this pancreatic duct model was in the same range as that in the intact gland. The duct cells responded to increasing doses of secretin (2-60 clinical U/kg/hr, i.v.) by producing more juice with increasing outputs of bicarbonate, sodium, potassium, and chloride. Bicarbonate concentration increased with the lowest dose of secretin up to values of 64 mEq/l and did not further increase with higher doses of secretin and increasing secretory rates. The potassium concentration increased with increasing doses of secretin and flow rates, whereas chloride concentration decreased in a reciprocal fashion to bicarbonate. Gastrin (20 µg/kg/hr) and cholecystokinin-pancreozymin (60 Ivy dog U) did not significantly stimulate the duct cells. Atropine (150 µg/kg followed by 150 µg/kg/hr or 250 µg/kg followed by 250 µg/kg/hr) did not inhibit the action of secretin on the flow rate or on bicarbonate secretion.

1857 EFFECTS OF CHOLECYSTOKININ ON ADENYLATE CYCLASE ACTIVITY IN DISPERSED PANCREATIC ACINAR CELLS. (Eng.) Long, B. W.; Gardner, J. D. (Natl. Inst. Arthritis, Metabolism, and Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014). *Gastroenterology* 73(5):1008-1014; 1977.

Studies were carried out to determine whether the receptor through which cholecystokinin octapeptide (CCK-OP) increases calcium outflux and cellular cyclic guanosine monophosphate (GMP) in intact acinar cells is the same receptor through which CCK-OP increases adenylate cyclase activity in a broken cell system. In addition, the ability of CCK-OP to modify the effect of other peptides on cyclic AMP in intact acinar cells and on adenylate cyclase in homogenates of acinar cells was examined. In dispersed acinar cells prepared from guinea pig pancreas, secretin, and vasoactive intestinal peptide (VIP) but not CCK-OP or [^{32}alanine] (^{32}Ala)-CCK-OP increased cyclic AMP concentration. At concentrations above 10^{-5} M CCK-OP as well as the 32-alanine analogue inhibited noncompetitively the increase in cyclic AMP level caused by secretin or VIP. In homogenates of acinar cells secretin, VIP, and CCK-OP but not [^{32}Ala]CCK-OP increased adenylate cyclase activity. At concentrations below 10^{-5} M, [^{32}Ala]-CCK-OP potentiated the increase in adenylate cyclase activity caused by secretin or VIP. At concentrations above 10^{-5} M, CCK-OP and the 32-alanine analogue inhibited noncompetitively the increase in adenylate cyclase activity caused by secretin and VIP. Analogues and fragments of CCK-OP showed a pattern for increasing adenylate cyclase activity that differed from that for increasing calcium outflux from intact acinar cells. These findings suggest that, in addition to the class of receptors that mediate the effects of CCK-OP on calcium outflux and cyclic GMP, pancreatic acinar cells possess two additional classes of receptors via which CCK-OP alters adenylate cyclase activity. One of these two classes of receptors is accessible only in broken cell preparations and, when occupied by CCK-OP, increases adenylate cyclase activity, whereas, when occupied by the 32-alanine analogue, potentiates the effects of secretin or VIP on adenylate cyclase activity. The other class of receptors is accessible to CCK-OP or [^{32}Ala]CCK-OP in intact cells as well as in homogenates, and, when occupied by either of these two peptides, inhibits the stimulation of adenylate cyclase activity by secretin, VIP, or CCK-OP.

1858 EFFECT OF CHOLECYSTOKININ VARIANT (CCK$_{39}$) ON DISPERSED ACINAR CELLS FROM GUINEA PIG PANCREAS. (Eng.) Sjodin, L.; Gardner, J. D. (Dept. Pharmacology, Karolinska Institutet S-10401, Stockholm, Sweden). *Gastroenterology* 73 (5):1015-1018; 1977.

Dispersed pancreatic acinar cells of male Hartley guinea pigs were used to investigate the effects of cholecystokinin (CCK$_{33}$) and a peptide termed "cholecystokinin variant" (CCK$_{39}$) on calcium outflux, cyclic GMP, amylase release, and adenylate cyclase activity, and these effects were compared with those of cholecystokinin octapeptide (CCK-OP). CCK$_{39}$ and CCK$_{33}$ or CCK-OP caused significant increases in the outflux of ^{45}Ca, cyclic GMP, and amylase release. In homogenates of acinar cells, each peptide caused a significant increase in adenylate cyclase activity. For each function tested, CCK$_{39}$ was equipotent with CCK$_{33}$; CCK$_{39}$ and CCK$_{33}$ were 10 to 30 times less potent than CCK-OP. The efficacies of CCK$_{39}$, CCK$_{33}$, and CCK-OP were the same, and none of these effects were altered by a concentration of atropine (10^{-4} M) sufficient to abolish the action of muscarinic cholinergic agents.

1859 SIMULTANEOUS MEASUREMENT OF BASAL PANCREATIC, GASTRIC ACID SECRETION, PLASMA GASTRIN, AND SECRETIN DURING SMOKING. (Eng.) Murthy, S. N. S.; Dinoso, V. P., Jr.; Clearfield, H. R.; Chey, W. Y. (Hahnemann Medical Coll. and Hosp., 230 North Broad St., Philadelphia, PA 19102). *Gastroenterology* 73(4, Part 1):758-761; 1977.

The effect of smoking one unfiltered cigarette every 15 min for 1 hr on basal gastric acid and pancreatic secretion was studied in 10 subjects with a history of duodenal ulcer and 10 without duodenal ulcer. All ulcer patients and five controls were smokers. Smoking induced a transient rise of basal acid output followed by a slight decrease. This effect was more pronounced in the duodenal ulcer group ($p<0.05$). Smoking markedly inhibited fluid and bicarbonate secretion during the smoking period. The bicarbonate and fluid secretion returned to control levels within 30 to 60 min in the ulcer group and in 60 to 90 min in the nonulcer group. There was no difference in the degree of inhibition of pancreatic secretion between the two groups. Immunoreactive gastrin and secretin in the peripheral venous blood did not change significantly during smoking. The degree of inhibition of basal pancreatic secretion correlated well with the plasma concentrations of nicotine; the correlation coefficients at 15, 30, 45, and 60 min during the smoking period were 0.290, 0.864, 0.925, and 0.451, resp. These observations indicate that smoking in the fasting state induces alterations of basal gastric and pancreatic secretions that are not related to changes in plasma gastrin and secretin concentration, but to plasma concentrations of nicotine.

1860 CHARACTERISTICS OF INHIBITION OF PANCREATIC SECRETION BY ISOPROTERENOL. (Eng.) Kelly, G. A.; Rose, R. C.; Nahrwold, D. L. (Milton S. Hershey Medical Center, Hershey, PA 17033). *Surgery* 82(5):680-684; 1977.

The effect of isoproterenol on pancreatic secretion stimulated by the octapeptide of cholecystokinin (OP-CCK) was studied in dogs with gastric and pancreatic fistulas. Special precautions were taken to prevent entry of gastric acid into the duodenum and reflux of duodenal content into the stomach; a balloon seal prevented the entry of gastric contents into the duodenum and reflux of duodenal content into the stomach, and the effectiveness of the seal was confirmed by the injection of phenol red. The i.v. infusion of OP-CCK increased volume and the outputs of bicarbonate and protein from the pancreas. Isoproterenol produced a dose-related inhibition of pancreatic responses to OP-CCK. Propranolol blocked the inhibitory action of isoproterenol completely. Analysis of data by Michaelis-Menten kinetics revealed that there was competitive inhibition of protein output with noncompetitive inhibition of bicarbonate output. The experiments show that isoproterenol inhibits OP-CCK-stimulated pancreatic secretion by a beta-adrenergic mechanism. The kinetic analysis suggests that the intimate mechanisms involved in inhibition of protein and bicarbonate output by isoproterenol are different.

1861 ACTION OF OLEIC ACID ON THE EXOCRINE PANCREATIC SECRETION OF THE CONSCIOUS RAT: EVIDENCE FOR AN ANTI-CHOLECYSTOKININ-PANCREOZYMIN FACTOR. (Eng.) Laugier, R.; Sarles, H. (INSERM U 31, 46 chemin de la Gaye, 13009 Marseille, France). *J. Physiol. (Lond.)* 271(1):81-92; 1977.

The effects of an intraduodenal infusion of oleic acid (2 ml in 60 min) on pancreatic secretion were assessed in conscious rats provided with a new type of duodenal cannula permitting the normal flow of pancreatic juice, but not of bile, between experiments. Intraduodenal oleic acid infusion induced increased water and bicarbonate secretion, which was still significantly above basal values 90 min after the end of the infusion. Protein output increased during the infusion, but protein concentration and output significantly decreased under basal levels 120 min and 150 min after infusion (-63 and -57% of basal values at 150 min, resp.). No inhibition was found when oleic acid was introduced into the cecum or into the first 20 cm of ileum isolated from the rest of small intestine. On the contrary, inhibition of protein secretion was induced immediately by intraileal oleic acid infusion. Inhibition of protein secretion secondary to intra-ileal oleic acid infusion was transmitted from a donor rat to a receiver rat by means of a cross-circulation. It is concluded that oleic acid induces an immediate and long lasting increase in water and bicarbonate secretion. During the infusion of oleic acid, protein output is increased, followed by inhibition. This delayed inhibition stems from the second part of the small intestine and was transferred from one rat to another by cross-circulation; it is speculated that oleic acid releases in the conscious rat (from the distal part of the small intestine) a hormonal factor inhibiting pancreatic secretion.

1862 EFFECT OF FASTING AND REFEEDING ON PANCREATIC DNA SYNTHESIS AND CONTENT. (Eng.) Mainz, D. L.; Parks, N. M.; Webster, P. D., III (Veterans Admin. Hosp., Augusta, GA 30904). *Proc. Soc. Exp. Biol. Med.* 156(2):340-344; 1977.

The effects of fasting and refeeding on pancreatic DNA content and rates of [^{14}C]thymidine incorporation into DNA were examined in male Sprague-Dawley rats. After fasting for 2, 4, and 6 days or fasting for 6 days with refeeding for 1, 2, and 3 days, pancreatic weight decreased 8%, 28%, and 43%, resp., and then increased 23%, 12%, and 36%, resp.; DNA content decreased 2%, 9%, and 20%, resp., and then increased 6%, 4%, and 16%, resp. [^{14}C]thymidine incorporation into DNA decreased 40%, 69%, and 86%, resp., and then increased 70%, 267%, and 511%, resp. These studies show the influence of fasting and refeeding on rates of pancreatic DNA synthesis and on DNA content. Control studies demonstrated similar decreases in kidneys, muscle, and spleen. These changes represent complex metabolic adaptive responses to food deprivation. The changes may be mediated in part by lack of substrate but probably also reflect alterations in the hormonal milieu.

1863 EFFECT OF FEEDING SOYBEAN FLOUR CONTAINING DIETS ON THE PROTEIN SYNTHETIC PATTERN OF THE RAT PANCREAS. (Eng.) Dijkhof, J.; Poort, S. R.; Poort, C. (Medical Sch., State Univ., Utrecht, 2501, 22 Nicolaas Beetsstraat, Netherlands). *J. Nutr.* 107(11):1985-1995; 1977.

The influence of p.o.-ingested diets containing raw soybean flour (RSD) as compared to heated soybean flour (HSD) on the *in vitro* synthesis of rat pancreatic secretory proteins was determined using a new method that avoids the determination of enzymic activity. After a 5-day feeding period, half of the pancreas is incubated with [^{3}H]leucine as the precursor, whereas the other half is presented with [^{14}C]leucine. Extracts are prepared from both pancreas halves, mixed, and the extract mixture is subjected to polyacrylamide gel electrophoresis. The ^{3}H/^{14}C ratio of disintegrations/min is determined in each 1-mm slice of the gel. Using this double-label method, it is possible to circumvent the determination of enzymic activity and of specific radioactivity per enzyme. Any change in the rate of synthesis of a protein is recorded as a deviation in the ^{3}H/^{14}C ratio from the total ratio between the two isotopes in trichloroacetic acid-insoluble material. Three amylases, three trypsinogens, two chymotrypsinogens, lipase, ribonuclease, and proelastase were localized in the gel. In RSD-fed rats, all amylase isoenzymes were synthesized at a lower rate than in the HSD-fed rats, whereas the synthesis of two trypsinogens and of one chymotrypsinogen were increased. The synthesis of the second chymotrypsinogen was slightly lowered, and ribonuclease, proelastase, and one trypsinogen were unaffected in their synthetic rates.

1864 RELATIONSHIPS BETWEEN FASTING AND POSTPRANDIAL PANCREATICODUODENAL PRESSURES, PANCREATIC SECRETION, AND DUODENAL VOLUME FLOW IN THE DOG. (Eng.) Owyang, C.; Dozois, R. R.; DiMagno, E. P.; Go, V. L. W. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *Gastroenterology* 73(5):1046-1049; 1977.

A canine model that allows simultaneous quantification of pancreatic enzyme outputs, duodenal volume flow, and pancreatic and duodenal pressures under physiological circumstances was developed to determine whether pancreaticoduodenal pressure relationships exist that may permit reflux into the pancreatic duct. Twelve studies on four conscious healthy dogs demonstrated that mean fasting pancreatic pressure was 5 to 10 cm H_2O higher than mean fasting duodenal pressure. Furthermore, 8 min after ingestion of a meal, both the pancreatic and the duodenal pressure increased. Surprisingly, the mean duodenal pressure was higher than the mean pancreatic pressure 20 min after feeding. This relationship lasted for 30 min. Elevation of postprandial pancreatic pressure occurred concomitantly with increased pancreatic enzyme output, and duodenal pressure increased with increased duodenal volume flow. The large postprandial duodenal volume flows associated with duodenal pressures greater than pancreatic duct pressures may favor reflux of duodenal contents into the pancreatic duct. These relationships may be important in the pathogenesis of postprandial pancreatitis and in the induction of pancreatic cancer.

1865 EXPERIMENTAL STUDY ON TRANSDUCTAL DISSEMINATION OF CANCER OF THE PANCREAS. (Eng.) Fujita, N.; Nakase, A. (Kyoto Univ. Medical Sch., Shogoin Kawaramachi 45, Sakyo-ku, Kyoto, 606 Japan). *Gastroenterol. Jpn.* 12(3):224-229; 1977.

The mechanism of transductal dissemination of pancreatic carcinoma was studied in the rabbit by injecting a V_{x2} carcinoma suspension into the pancreatic duct. Ductal occlusion was conducive to implantation and growth in the pancreas of intraductal floating cancer cells, and tumors occurred in all rabbits with occlusion. Tumor growth also occurred in 40% of animals in which the duct was not occluded. Implantation of intraductal floating cancer cells took place by direct embedding into the ductal wall and by leakage of cancer cells from the duct in the process of pancreatic fibrosis due to ductal obstruction. Expansive tumor growth in the pancreas was more vigorous in pancreas with less fibrosis and was most active with concomitant acute pancreatitis or where the pancreas was x-irradiated (1,000-1,250 rads) 1 week before injection of the carcinoma suspension.

1866 STIMULUS-SECRETION COUPLING IN THE EXOCRINE PANCREAS: STUDIES WITH VINBLASTINE, DEUTERIUM OXIDE AND CYTOCHALASIN B [Abstract]. (Eng.) Stock, C.; Launay, J. F.; Bauduin, H.; Grenier, J. F. *Ir. J. Med. Sci.* 146(Suppl. 1):19-20; 1977.

1867 EFFECT OF ENKEPHALIN AND MORPHINE ON HORMONES STIMULATING EXOCRINE PANCREATIC SECRETION [Abstract]. (Eng.) Konturek, S. J.; Tasler, J.; Cieszkowski, M.; Jaworek, J. (Inst. Physiology, Medical Acad., Cracow, Poland). *Ir. J. Med. Sci.* 146(Suppl. 1):14-15; 1977.

1868 PHYSIOLOGICAL ROLE OF PP IN MAN [Abstract]. (Eng.) Bloom, S. R.; Greenberg, G. R.; Adrian, T. E.; Besterman, H. S.; Mallinson, C. N.; McCloy, R. F.; *et al.* (Hammersmith Hosp., London W12, England). *Ir. J. Med. Sci.* 146(Suppl. 1):15; 1977.

1869 PANCREATIC EFFECTS OF A PARTIALLY PURIFIED DUODENAL SOMATOSTATIN-LIKE IMMUNOREACTIVE PEPTIDE (S.L.I.) [Abstract]. (Eng.) Susini, C.; Pradayrol, L.; Bommelaer, G.; Esteve, J. P.; Vaysse, N.; Chayvialle, J. A.; *et al.* (INSERM U 151, Biologie et Pathologie Digestive, Toulouse, France). *Ir. J. Med. Sci.* 146(Suppl. 1):15; 1977.

1870 EFFECTS OF GLI AND PANCREOTONE ON PANCREATIC AND GASTRIC SECRETION [Abstract]. (Eng.) Harper, A. A.; Buchanan, K. D.; Conlon, J. M.; Hood, A. J. C.; Murphy, R. F.; Mushens, J.; Smy, J. R. (Queens's Univ., Belfast, Northern Ireland). *Ir. J. Med. Sci.* 146(Suppl. 1):17; 1977.

1871 THE HUMAN PANCREATIC RESPONSE TO LOW-DOSE SECRETIN STIMULATION [Abstract]. (Eng.) Worning, H.; Fahrenkrug, J.; Schaffalitzky De Mukadell, O. B.; Boolsen, S. W. (Glostrup Hosp., Copenhagen, Denmark). *Ir. J. Med. Sci.* 146(Suppl. 1):17; 1977.

1872 THE ROLE OF CYCLIC NUCLEOTIDES IN EXOCRINE PANCREATIC STIMULUS SECRETION COUPLING [Abstract]. (Eng.) Teufel, H.; Go, K.; Skrampaks, M.; Forell, M. M. (Medizinische Klinik der Universitat Munchen, Munich, W. Germany). *Ir. J. Med. Sci.* 146(Suppl. 1):19; 1977.

1873 MECHANISMS OF INHIBITION OF EXOCRINE PANCREATIC SECRETION BY SOMATOSTATIN IN RATS [Abstract]. (Eng.) Chariot, J.; Roze, C.; Vaille, C.; Debray, C. (Hopital Bichat, 170 Bld. Ney, 75018 Paris, France). *Ir. J. Med. Sci.* 146 (Suppl. 1):21; 1977.

1874 EFFECTS OF CHOLECYSTOKININ AND SOMATOSTATIN ON PANCREATIC ENZYME SECRETION AND TISSUE LEVELS OF CYCLIC GMP AND CYCLIC AMP [Abstract]. (Eng.) Albano, J. D. M.; Bhoola, K. D.; Harvey, R. F. (Univ. Dept. Medicine, Bristol, England). *Ir. J. Med. Sci.* 146(Suppl. 1):21-22; 1977.

1875 THE EFFECT OF PROSTAGLANDINS E2 AND F2α ON PANCREATIC EXOCRINE SECRETION AND BLOOD FLOW [Abstract]. (Eng.) Glazer, G.; Needham, T. N. (St. Mary's Hosp., London W2, England). *Ir. J. Med. Sci.* 146(Suppl. 1):8-9; 1977.

1876 EFFECT OF PLASMA H^+-ION CONCENTRATION ON PANCREATIC BICARBONATE SECRETION:

EVIDENCE SUPPORTING THE PROTON PUMP HYPOTHESIS [Abstract]. (Eng.) Raeder, M.; Mo, A. (Ullevaal Hosp., Oslo, Norway). *Ir. J. Med. Sci.* 146(Suppl. 1):5; 1977.

1877 THE EFFECT OF STIMULATION ON IONIZED CALCIUM CONCENTRATION IN PANCREATIC ACINAR CELLS [Abstract]. (Eng.) Petersen, O. H.; Iwatsuki, N. (Dept. Physiology, Univ. Dundee, Dundee DD1 4HN, Scotland). *Ir. J. Med. Sci.* 146(Suppl. 1):6; 1977.

1878 INHIBITORY ACTION OF HIGH DOSES OF SECRETIN ON PANCREATIC PROTEIN SECRETION IN THE DOG [Abstract]. (Eng.) Devaux, M. A.; Tiscornia, O. M.; Verine, H.; Sarles, H. (Unite 31 INSERM, 46 chemin de la Gaye, 13009, Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1):6-7; 1977.

See also, 1736, 1775, 1778, 1791, 1837, 1839, 1986, 1993, 2307, 2463, 2492, 2591, 2607.

SECRETION AND METABOLISM

Hepatobiliary Tract

1879 PREPARATION OF PARENCHYMAL AND NON-PARENCHYMAL CELLS FROM ADULT HUMAN LIVER--MORPHOLOGICAL AND BIOCHEMICAL CHARACTERISTICS. (Eng.) Bojar, H.; Basler, M.; Fuchs, F.; Dreyfurst, R.; Staib, W. (Institut fur Physiologische Chemie II der Universitat Dusseldorf, Moorenstrasse 5, 4000 Dusseldorf, W. Germany). *J. Clin. Chem. Clin. Biochem.* 14(11):527-532; 1976.

A method for the preparation and separation of isolated human liver cells into pure parenchymal and nonparenchymal cell suspensions is described, and the cells are briefly characterized. A mixed suspension of various cell types was obtained by perfusing the isolated human liver with collagenase and hyaluronidase. Pure parenchymal cells are prepared by differential centrifugation, pure nonparenchymal cells by the use of pronase and subsequent isopycnic centrifugation on metrizamide gradients (50-300 g/l). About 90% of the parenchymal and nonparenchymal cells were viable as judged by trypan blue staining. Nonparenchymal cells were not capable of gluconeogenesis but utilized glucose at high rates. Parenchymal cells retained their ability to form glucose and to accumulate glycogen from fructose; glycogen was also synthesized, but to a lesser extent, when lactate or alanine were used as substrate. Studies on binding of ^{125}I-labeled insulin by isolated parenchymal cells were performed at 30 C. The binding data may fit a model with a minimum of two classes of binding sites: (a) high affinity-low capacity sites (dissociation constant [K_d] ∿6.6 nM, capacity ∿16,000 insulin molecules/cell) and (b) low affinity-high capacity sites (K_d ∿0.37 μM, capacity ∿646,000 molecules/cell).

1880 THE BILE ACID COMPOSITION OF RABBIT AND CAT GALL-BLADDER BILE. (Eng.) Taylor, W. (Medical Sch., Univ. Newcastle upon Tyne, Newcastle upon Tyne NE1 7RU, England). *J. Steroid Biochem.* 8(10):1077-1084; 1977.

Nonsulfated and sulfated bile acids from gallbladder bile of rabbits and cats were analyzed by gas chromatography-mass spectrometry. In the nonsulfated fraction of rabbit bile, deoxycholic acid was the predominant bile acid. The sulfate fraction (B.A.S.) contained lithocholic acid and small amounts of deoxycholic acid, allodeoxycholic acid, and their 3- and 12-epimers. No sex difference in the composition of rabbit bile was found. The nonsulfated fraction of cat bile contained the normal primary and secondary bile acids, with smaller amounts of other bile acids. The B.A.S. fraction contained isomers of cholic and deoxycholic acids; allodeoxycholic and lithocholic acids predominated. The pattern of bile acids in the B.A.S. fraction of cat bile was much more complex than that of rabbit bile. An important feature of the cat bile B.A.S. fraction was the very small amount of cholic acid present. Male cats produced about twice as much B.A.S. as did female cats, but the females produced more nonsulfated bile acids than the males.

1881 EFFECTS OF CHLORPROMAZINE HYDROCHLORIDE ON BILE FLOW, BILE SALT SYNTHESIS AND BILIARY LIPID SECRETION IN THE PRIMATE. (Eng.) Ros, E.; Small, D. M.; Carey, M. C. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press (Baltimore, MD): 219-227; 1977.

The effects of i.v. infusions of chlorpromazine hydrochloride (2.5-10.0 mg/kg) on bile formation were investigated in the bile fistula rhesus monkey during stimulation of the enterohepatic circulation with a constant infusion of [^{14}C]sodium taurocholate. Chlorpromazine reversibly inhibited bile salt-independent flow and biliary lipid secretion. During cholestasis, extrahepatic retention of bile salt occurred, and endogenous bile salt synthesis was impaired either due to the drug itself or its metabolites or to the retained bile salts. These studies indicate that, in the rhesus monkey, chlorpromazine cholestasis is not prevented by simulation of an intact enterohepatic circulation.

1882 HEPATIC UPTAKE, STORAGE AND BILIARY TRANSPORT MAXIMUM OF BILE ACIDS IN THE DOG. (Eng.) Erlinger, S.; Poupon, R.; Glasinovic, J. C.; Dumont, M. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press (Baltimore, MD): 107-112; 1977.

The hepatic uptake of taurocholate was estimated in anesthetized dogs using a multiple-indicator dilution method. The nonlinear increase of the velocity of uptake of taurocholate with the dose was consistent with saturation kinetics. The increase in the half-saturation constant of taurocholate upon the addition of taurochenodeoxycholate was consistent with competitive inhibition of taurocholate uptake by taurochenodeoxycholate. This result suggests the existence of a carrier-mediated transport system for the uptake of bile acids. Intracellular storage and biliary transport maximum were assessed by a multiple-infusion method. A relative storage capacity was measured for both taurocholate and taurochenodeoxycholate, suggesting a storage phenomenon for bile acids. Biliary transport maximum, estimated by the same method, was 6-10 times lower than the maximal initial velocity of uptake. These studies indicate that, in the overall process of hepatic transport, excretion may be the limiting step and intracellular storage may occur.

1883 SEX DIFFERENCES IN SULFATION AND EXCRETION OF 5α-CHOLANOIC ACIDS IN RATS. (Eng.) Eriksson, H.; Taylor, W.; Sjovall, J. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting Held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press (Baltimore, MD): 75-81; 1977.

In order to study sex differences in the sulfation and excretion of 5α-cholanoic acids in rats, bile acids in bile from male and female rats were analyzed by ion exchange chromatography and repetitive scanning gas chromatography-mass spectrometry. Female rats excreted 5 to 10 times more sulfated bile acids than male rats. Most sulfated bile acids had a 5α-configuration and allochenodeoxycholic acid was the major compound, excreted only by female rats. The main part of allochenodeoxycholic acid may arise via microsomal 5α-reduction, whereas dietary cholestanol may be the major precursor of allocholic acid.

1884 EXCRETION OF TAUROCHOLATE FROM ISOLATED HEPATOCYTES. (Eng.) Schwarz, L. R.; Schwenk, M.; Pfaff, E.; Greim, H. (Abteilung fur Toxikologie, Gesellschaft fur Strahlen- und Umweltforschung mbH, Ingolstadter Landstrasse 1, D-8042 Neuherberg, W. Germany). *Eur. J. Biochem.* 71(2):369-373; 1976.

Efflux of taurocholate from isolated rat hepatocytes was studied to characterize the mechanism of bile acid secretion and to investigate whether isolated hepatocytes are suitable to study bile acid secretion. Cells from male Sprague-Dawley rats were incubated with taurocholate for 15 min. The amount of the intracellularly accumulated bile acid was directly related to the concentration in the medium (5-100 μM). Transfer of the loaded cells from the incubation medium to a medium without taurocholate led to taurocholate efflux. Efflux was saturable, and its activation energy amounted to 12 kcal/mol. It was almost completely inhibited by 5 μg/ml antimycin A and by 23% by the uncoupler carbonyl cyanide-*m*-chlorophenylhydrazone (2 μM). Dinitrofluorobenzene and mersalyl, reagents that react with amino acids, inhibited efflux by about 30% when applied at concentrations of 50 μM. Ouabain (1 mM) increased the rate of efflux. The observations indicate that secretory functions are maintained in isolated liver cells.

1885 EFFECTS OF CHOLESTATIC STEROIDS ON UPTAKE AND RELEASE OF TAUROCHOLATE IN ISOLATED HEPATOCYTES. (Eng.) Schwarz, L. R.; Schwenk, M.; Greim, H. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press (Baltimore, MD): 145-150; 1977.

Uptake and efflux of taurocholate were studied in isolated liver cells. Both processes were found to be saturable, energy dependent, and susceptible to protein reagents. Norethandrolone (500 μM), 17-β estradiol (50 μM), and progesterone (50 μM) inhibited taurocholate uptake into hepatocytes. Norethandrolone decreased efflux of the bile acid only at the very high concentration of 500 μM. Thus, inhibition of taurocholate uptake may be involved in the pathogenesis of steroid-induced intrahepatic cholestasis

1886 ACCELERATED HEPATIC HAEM CATABOLISM IN THE SELENIUM-DEFICIENT RAT. (Eng.) Burk, R. F.; Correia, M. A. (Univ. Texas Health Science Center, Dallas, TX 75235). *Biochem. J.* 168(1):105-111; 1977.

The heme anabolism and catabolism were studied in phenobarbital-treated, selenium-deficient rats; in addition, apo-(cytochrome P-450) synthesis was investigated in these rats. Hepatic microsomal cytochrome P-450 concentrations were lower in selenium-deficient rats treated with phenobarbital (80 mg/kg, i.p.) for 4 days than in similarly treated controls. No defect in heme synthesis was found on the basis of measurements of δ-aminolevulinate synthase; δ-aminolevulinate dehydratase and ferrochelatase activities; and urinary excretion of δ-aminolevulinate, porphobilinogen, uroporphyrin, and coproporphyrin. No defect in apo-(cytochrome P-450) synthesis was found by studies of [^{3}H]- and [^{14}C]leucine incorporation into apo-(cytochrome P-450) separated by sodium dodecyl sulfate/polyacrylamide-gel electrophoresis. An increase in heme catabolism was found. An eightfold increase in hepatic microsomal heme oxygenase activity occurred in selenium-deficient rats after phenobarbital treatment, compared with a less than twofold increase in control rats. Breath ^{14}CO excretion after administration of δ-amino[5-^{14}C]levulinate was greater by phenobarbital-treated selenium-deficient rats than by similarly treated controls. These studies demonstrate that the defective induction of cytochrome P-450 by phenobarbital in selenium-deficient rats is accompanied by increased heme catabolism, which could be due to increased breakdown of cytochrome P-450 or to catabolism of heme before it attaches to the apo-cytochrome. The role of selenium in stabilizing cytochrome P-450 and/or in protecting heme from breakdown remains to be determined.

1887 THE TRANSFER OF ESTRONE GLUCURONIDE TO BILE IN AN ISOLATED PERFUSED RAT LIVER SYSTEM.

(Eng.) Watanabe, H. (Drug Res. Lab., Ottawa, Ontario K1A OL2, Canada). *Steroids* 29(6): 837-848; 1977.

In an effort to establish a system for the study of biliary estrogen excretion, an isolated rat liver perfusion system was used in a study of the biliary excretion of estrone glucuronide. The estrogen was previously shown to be excreted without prior metabolism. Disappearance from the medium was rapid, and biliary concentrations exceeded that in the medium by more than a 1,000-fold. Disappearance rates were decreased when the estrone glucuronide concentrations in the medium exceeded 0.29 mM. Inhibition by other steroidal conjugates, testosterone glucuronide, 2-methoxyesterone (3-hydroxy-2-methoxy-estra-1,3,5(10)-trien-17-one) glucuronide, and 2-hydroxyestrone (2,3-dihydroxyestra-1,3,5(10)-trien-17-one) glutathione, was also demonstrated. Phenolphthalein glucuronide, at 10 times the molar concentration of estrone glucuronide, did not affect the medium clearance of the latter compound. These findings indicate the possibility of utilizing this system for further studies of possible interactions by other organic compounds for biliary excretion.

1888 REGULATION OF UREA SYNTHESIS IN RAT LIVER. CHANGES OF ORNITHINE AND ACETYLGLUTAMATE CONCENTRATIONS IN THE LIVERS OF RATS SUBJECTED TO DIETARY TRANSITIONS.

(Eng.) Saheki, T.; Katsunuma, T.; Sase, M. (Sch. Medicine, Tokai Univ., Bohseidai, Isehara, Kanagawa 259-11, Japan). *J. Biochem. (Tokyo)* 82(2):551-558; 1977.

Regulation of urea synthesis *in vivo* was studied in rats subjected to acute dietary transitions from a 70% to a 5% casein diet or *vice versa*. A 700% increase in urea excretion and a significant increase in urea level in the liver preceded an increase in argininosuccinate synthetase activity when the casein level was increased, and significant decreases in these levels were seen when the casein level was decreased. Immunochemical determination of argininosuccinate synthetase showed that the increase/decrease of the enzyme activity was directly related to the actual increase/decrease of the amount of enzyme protein. The ratios of the initial velocity of urea synthesis from ammonium chloride to the enzymatic activity of argininosuccinate synthetase in the perfused livers were determined. Shortly after the switch of casein diet from 70% to 5%, the ratios decreased to much lower values than those of rats fed on the 5% casein diet for 7 days, while, during the acute transition from 5% to 70% casein diet, the ratios increased above the values of rats fed on the 70% casein diet for 7 days. The concentrations of ornithine and acetylglutamate capable of stimulating urea synthesis changed significantly shortly after the dietary switch. The concentration of ornithine overshot the steady-state level of rats fed on 70% casein after the dietary switch from 5% to 70% casein. Ornithine concentration declined rapidly after the dietary switch from 70% to 5%, falling below the steady-state level of rats fed on the 5% casein diet. Thus, in both cases, new steady-state levels of ornithine concentration were established. The findings that fluctuations of ornithine and acetylglutamate concentration were greater and occurred prior to the activity changes of argininosuccinate synthetase strongly suggest a possible regulatory function of these amino acids in urea synthesis.

1889 OXYGEN GRADIENTS DURING HYPOXIC STEADY STATES IN LIVER. URATE OXIDASE AND CYTOCHROME OXIDASE AS INTRACELLULAR O_2 INDICATORS.

(Eng.) Sies, H. (Institut fur Physiologische Chemie, Physikalische Biochemie und Zellbiologie der Universitat Munchen, Goethestrasse 33, D-8000 Munchen 2, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(8):1021-1032; 1977.

Urate oxidase and cytochrome oxidase were assayed in a study of intercellular O_2 gradients in hypoxic steady states in the isolated perfused liver and isolated hepatocytes of male Wistar rats. An O_2 concentration of 1.0 mM in the influent resulted in a cytochrome oxidase reduction of 0% and a 100% rate of urate removal by the liver (274 nmol/min/g liver). Urate removal in the isolated hepatocytes was 528 nmol/min/g hepatocytes. In the hypoxic steady state in the hepatocytes, there was a 90% restriction of urate removal with only a 10% reduction of cytochrome oxidase. These results show a similar dependence of urate oxidase and cytochrome oxidase on O_2 concentration in the perfused liver. The observed differences of O_2 dependence between the intact liver and the isolated hepatocytes suggest that in hypoxic steady states of the intact perfused liver, areas of high and low O_2 concentrations coexist.

1890 RECONSTITUTION OF THE MICROSOMAL ETHANOL-OXIDIZING SYSTEM: QUALITATIVE AND QUANTITATIVE CHANGES OF CYTOCHROME P-450 AFTER CHRONIC ETHANOL CONSUMPTION. (Eng.) Ohnishi, K.; Lieber, C. S. (Bronx Veterans Admin. Hosp., Bronx, NY). *J. Biol. Chem.* 252(20):7124-7131; 1977.

An ethanol-oxidizing system was reconstituted with cytochrome P-450, NADPH-cytochrome c reductase, and phospholipid. This system also metabolized propanol, butanol, and benzphetamine. Chronic ethanol feeding of either male or female rats for 4 to 12 weeks resulted in significant quantitative and qualitative changes in hepatic cytochrome P-450. The absorption maximum of CO-difference spectrum of cytochrome P-450 shifted to higher wavelength. Three hemoproteins were resolved by continuous buffer sodium dodecyl sulfate-polyacrylamide gel electrophoresis of rat liver microsomes. Two of these increased after chronic ethanol feeding. One of these hemoproteins was seen to be distinct from those induced by phenobarbital or 3-methylcholanthrene treatment. On discontinuous buffer sodium dodecyl sulfate-polyacrylamide gel electrophoresis there was a preferential increase of two proteins with apparent molecular weights of 53,400 and 52,000, resp. These two proteins probably represent the apoproteins of the two hemoproteins increased after chronic ethanol feeding. The partially purified cytochrome P-450 from ethanol-fed rats was more active for alcohol (ethanol, propanol, butanol) oxidation than was the control preparation in the presence of excess NADPH-cytochrome c reductase and L-α-dioleoyl lecithin. There was no significant difference in the capacity of partially purified NADPH-cytochrome c reductase from either ethanol-fed rats or controls to promote alcohol oxidation in the presence of cytochrome P-450 and L-α-dioleoyl lecithin. Thus, the adaptive increase of the microsomal ethanol-oxidizing system activity after chronic ethanol consumption can be attributed, at least in part, to quantitative and qualitative changes of cytochrome P-450.

1891 EFFECTS OF PROTEIN DEFICIENCY AND EXCESS ON HEPATIC MIXED FUNCTION OXIDASE ACTIVITY IN GROWING AND ADULT FEMALE RATS. (Eng.) Clinton, S. K.; Truex, C. R.; Visek, W. J. (Sch. Basic Medical Sciences, Univ. Illinois, Urbana, IL 61801). *Nutr. Rep. Int.* 16(4):463-470; 1977.

The effects of protein deficiency and excess on hepatic mixed function oxidase activity were studied in weanling and adult female Sprague-Dawley rats fed diets containing 7.5%, 15%, or 45% protein. Differences in body weight, liver lipids, and liver proteins were observed in rats fed experimental diets for 1 month but not 8 months. Increasing levels of cytochrome P-450, cytochrome b_5, and aniline hydroxylase were observed as dietary protein increased in both weanlings and adults; the cytochrome P-450 levels were 14.0 ± 1.0, 18.0 ± 3.0, and 24.0 ± 3.0 nmol/100 mg protein in rats fed 7.5%, 15%, and 45% protein for 8 months after weaning, resp., and 2.0 ± 0.6, 6.0 ± 0.3, and 9.0 ± 1.4 nmol/100 mg in those fed the respective diets for 1 month after weaning. The respective cytochrome b_5 levels in the rats fed for 8 months were 50.0 ± 4.0, 60.0 ± 10, and 74.0 ± 7 nmol/100 mg protein; in the rats fed for 1 month, the levels were 6.0 ± 1.0, 11.0 ± 1.0, and 17.0 ± 2 nmol/100 mg, resp. The aniline hydroxylase levels were 1.30 ± 0.08, 1.88 ± 0.08, and 2.18 ± 0.17 nmol *p*-aminophenol produced per 20 min/mg microsomal protein in the rats fed for 8 months and 0.45 ± 0.11, 0.66 ± 0.03, and 1.30 ± 0.08 nmol *p*-aminophenol produced per 20 min/mg microsomal protein in those fed for 1 month. The rats were able to compensate for the dietary-induced changes in liver composition and weight gain seen after 1 month; however, differences in mixed function oxidase activity were still evident in adults. The data show that alterations in mixed function oxidase activity are produced by protein excess as well as protein deficiency.

1892 HEPATIC OXIDATIVE DRUG METABOLISM IN RATS WITH EXPERIMENTAL RENAL FAILURE. (Eng.) Van Peer, A. P.; Belpaire, F. M. (Univ. Ghent Medical Sch., De Pintelaan 135, B-9000 Ghent, Belgium). *Arch. Int. Pharmacodyn. Ther.* 228(2):180-183; 1977.

To investigate the shortened half-life of drugs eliminated by the liver that is observed in renal failure in man, the activity of the drug-oxidizing system was studied in liver homogenates from control and uremic rats. Acute renal failure was achieved by ligation of the ureters or by the i.v. injection of urnayl nitrate. In the uremic state, the concentration of cytochrome P-450 and the activity of aniline hydroxylase were not significantly changed, but the activity of aminopyrine *N*-demethylase was significantly decreased (ureter ligation: 34.8 ± 2.6 versus 25.4 ± 2.9 nmol aminopyrine transformed/g liver/min, $p<0.05$; uranyl nitrate injection: 45.1 ± 2.3 versus 34.0 ± 1.8 nmol/g/min, $p<0.01$). In rats the hepatic oxidizing enzymes are not induced by uremia, in contrast to what has been suggested in man.

1893 GLUTATHIONE PEROXIDASE SYSTEM AND MICROSOMAL LIPOPEROXIDATION IN PRENECROTIC STAGES OF DIETARY HEPATIC NECROSIS IN RATS. (Eng.) Porta, E. A.; Ching, B. K. F.; Joun, N. S. (John A. Burns Sch. Medicine, Univ. Hawaii, Honolulu, HI 96822). *J. Nutr.* 107(10):1852-1858; 1977.

The possible relation between the state of the hepatic cytosol glutathione peroxidase (GSH-Px) system (including glutathione reductase, GSH-Rd, and glucose 6-phosphate dehydrogenase, G-6-PD) and hepatic microsomal lipoperoxidation (MLP) was investigated in male Wistar rats. In addition, to study the possible implications of these factors in the development of hepatic necrosis, weanling male rats were fed a basal diet low in Se and vitamin E or were pair-fed with the same diet supplemented with either *dl*-α-tocopherol (3 mg/100 g diet), sodium selenite (0.36 mg/100 g diet), or both. Rats from the four groups were killed at 9, 20, and 26 days. At the prenecrotic stage, GSH-Px activity in rats fed the basal diet alone was reduced by 97%, and the *in vitro* MLP levels (malonaldehyde) were increased by sevenfold as compared with rats fed the diet supplemented with Se and vitamin E. However, *in vivo* MLP (diene conjugation) was only detected in the liver of one rat that already had foci of necrosis at the time of killing. The decrease in GSH-Px was completely prevented by Se, but vitamin E had no effect. Dietary vitamin E and/or Se had little effect on the activity of GSH-Rd, but both agents, singly or in combination, prevented the reduction of G-6-PD that occurred in rats deficient in vitamin E and Se. The increased *in vitro* MLP was only partially reduced by either Se or vitamin E, since in both cases there still were threefold increases. These results suggest that (a) no clear-cut relation exists between the massive decline of cytosol GSH-Px and the development of hepatic necrosis, (b) the state of GSH-Px is probably unrelated to MLP, and (c) microsomes may not be the initial site of damage.

1894 ISOLATION OF II-ALCOHOL DEHYDROGENASE OF HUMAN LIVER: IS IT A DETERMINANT OF ALCOHOLISM? (Eng.) Li, T. K.; Bosron, W. F.; Dafeldecker, W. P.; Lange, L. G.; Vallee, B. L. (Indiana Univ. Sch. Medicine, Indianapolis, IN 46202). *Proc. Natl. Acad. Sci.* 74(10):4378-4381; 1977.

A functionally distinct, pyrrazole-insensitive form of human liver alcohol dehydrogenase (ADH), designated II-ADH, was isolated from human livers by affinity chromatography on 4-[3-(*N*-6-aminocaproyl) aminopropyl]-pyrazole-Sepharose, and its use as a determinant of alcoholism was investigated. II-ADH was found to be remarkably insensitive (apparent inhibition constant, K_I=500 μM) to pyrazole and its derivatives, which are usually potent ADH inhibitors (K_I=1 μM). This insensitivity of II-ADH to pyrazole inhibition permitted quantitation of its role in hepatic ethanol oxidation. At 5 mM ethanol, a saturating concentration for virtually all other forms of ADH, II-ADH contributed less than 15% to total ethanol oxidation. However, at intoxicating concentrations (60 mM), it accounted for as much as 40% of the total ethanol oxidation rate of liver, indicating a seemingly unique role for this enzyme form in ethanol elimination. The amount of II-ADH was found to vary from liver to liver of individuals and to be considerably more labile than the other molecular forms, phenomena whose inter- or independence requires further study. The isolation of human II-ADH advances efforts to recognize and understand biochemical mechanisms that may be biological determinants of alcoholism and alcohol-related disease states.

1895 TRITIUM EFFECT IN PEROXIDATION OF ETHANOL BY LIVER CATALASE. (Eng.) Damgaard, S. E. (Dept. Biochemistry A, Panum Inst., Univ. Copenhagen, DK-2200 Copenhagen, Denmark). *Biochem. J.* 167(1):77-86; 1977.

The ^3H isotope effect was calculated by the simultaneous determination of the rate of appearance of ^3H in water from [(1*R*-)-1-$^3H_1$]ethanol and the rate of acetaldehyde formation in the presence of rat- or ox liver catalase under conditions of steady-state generation of H_2O_2. The mean value of 2.52 obtained for rat-liver catalase at 37 C and pH 6.3-7.7 was independent of both ethanol concentration and the rate of H_2O_2 generation over a wide range. At 25 C, a slightly lower mean value of 2.40 was obtained with the ox liver catalase. Neither the product, acetaldehyde, nor 4-methylpyrazole influenced the two rates measured in the assay. Relating the value obtained for the ^3H isotope effect to a known value for the ^3H isotope effect strongly supported the view that both values are close to the true isotope effect with the respective substituted compounds on the rate constant in the catalytic step involving scission of the C-H bond. The constancy of the isotope effect under various conditions makes it possible to use it for interpretations *in vivo*. It was established that β-D-galactose dehydrogenase exhibits B-specificity towards the nicotinamide ring in NAD.

1896 EVIDENCE FOR CARBON TETRACHLORIDE- AND ETHANOL-INDUCED LIPID PEROXIDATION IN VIVO DEMONSTRATED BY ETHANE PRODUCTION IN MICE AND RATS. (Eng.) Koster, U.; Albrecht, D.; Kappus, H. (Inst. Toxicology, Univ. Tubingen, D 7400 Tubingen, W. Germany). *Toxicol. Appl. Pharmacol.* 41(3):639-648; 1977.

Experiments were carried out in mice and rats to determine whether carbon tetrachloride or ethanol induces lipid peroxidation. Mice and rats received carbon tetrachloride (1 g/kg) i.p. and were placed in a gas-tight all-glass desiccator connected to a gasometer containing pure oxygen. At different times gas samples from the dessicator were examined for their ethane content. Mice produced about 75 nmol of ethane/kg during 4 hr, whereas rats exhaled 45 nmol/kg during this time period. Control mice and rats produced only small amounts of ethane. Rats pretreated chronically with carbon tetrachloride (0.4 g/kg/day) for 6 weeks produced only about 21 nmol of ethane/kg during the 4 hr following an acute dose of carbon tetrachloride (1 g/kg). After rats were treated with ethanol (5 g/kg), they exhaled about 17 nmol of ethane/kg during 4 hr. The experiments demonstrate that, qualitatively, rats and mice do not differ in ethane production after carbon tetrachloride treatment. However, quantitatively, there are species variations. The results support the suggestion that acute doses of ethanol can induce lipid peroxidation *in vivo*.

1897 URINARY EXCRETION OF ALPHA-FETOPROTEIN IN RATS ON A CIRRHOGENIC CARBON TETRACHLORIDE REGIMEN. (Eng.) Boss, J. H.; Zajicek, G.; Rosenmann, E. (Hadassah Univ. Hosp., Mount Scopus, Israel). *J. Pathol.* 123(2):85-92; 1977.

The pattern of urinary excretion of alpha-fetoprotein (AFP) in the course of the development of liver cirrhosis induced by carbon tetrachloride was studied in rats, and compared with that in animals maintained on a hepatocarcinogenic regimen (3'methyl-4-dimethylaminoazobenzene, 0.06% in the diet). AFP was detected in the serum and urine of 2- to 9-month-old rats subjected to protracted CCl_4 (0.1 ml/100 g, s.c., twice weekly) poisoning. During the first 3 months of the experiment, urinary excretion of AFP was found in 30-40% of the animals, increasing to 70% thereafter. The liver lesions progressed from acute parenchymal necrosis to cirrhosis, but hepatocellular carcinomas did not develop. Uptake of tritiated thymidine by the hepatocytes increased significantly but was constant throughout the experimental period. In the rats fed the carcinogenic diet, the incidence of AFP excretion decreased from 35% at 4-7 weeks to 20% at 10-16 weeks after beginning the regimen; during the former period, the difference in the incidence of positive urine specimens was significantly different from that in the rats fed the CCl_4-containing diet ($p<0.05$). It may be argued that the failure to induce hepatomas was related to the short timespan of the experiment (too short for tumorigenesis to be manifested). Unfortunately, however, none of the rats survived beyond the 7th month of CCl_4 treatment.

1898 HEPATOTOXIC RESPONSE TO SINGLE OR REPEATED INJECTIONS OF N-NITROSOPYRROLIDINE IN THE RAT.

(Eng.) Hendy, R.; Grasso, P. (British Industrial Biological Res. Assoc., Woodmansterne Rd., Carshalton, Surrey SM5 4DS, England). *Chem. Biol. Interact.* 18(3):309-326; 1977.

The acute hepatotoxic effects of *N*-nitrosopyrrolidine (NPY) were studied in Wistar rats. Twenty-four hours after a single NPY dose of 100 mg/kg, centrilobular fatty change and inflammatory cell infiltrate occurred. There was no cell necrosis. Cytochemically, the centrilobular and mid-zonal areas showed autophagy, reduction in lysosomes, and a depression of glucose-6-phosphatase. Less severe changes occurred after a single dose of 30 mg/kg, and there were no detectable alterations after 10 mg/kg. Repeated daily injection of 100 or 30 mg/kg led to megalocytosis of hepatocytes after six doses. Because rats were unable to survive more than 7 NPY doses of 100 mg/kg levels of 30, 10, or 3 mg/kg were administered daily for up to 12 weeks. By 8-12 weeks, most hepatocytes in the centrilobular area were enlarged, and glucose-6-phosphatase activity was low. The lysosomal activity was variable; in some cells it resembled controls, and in others there were few lysosomes scattered haphazardly throughout the hepatocyte. Cells with this low lysosomal activity at 12 weeks generally grouped in island-like areas and ultrastructurally were rich in smooth endoplasmic reticulum. Only marginal changes were observed in rats that received 3 mg/kg throughout this period. PAS-positive, iron-containing pigment filled the Kupffer cells in all rats treated for more than 6 days with 30 mg/kg. The hepatomegalocytes resemble those produced by pyrrolizidine alkaloids, which may imply an antimitotic effect similar to that exerted by NPY on primary rat kidney cells in culture.

1899 THE SYNTHESIS OF TOTAL AND SPECIFIC GLYCOSAMINOGLYCANS DURING DEVELOPMENT OF EXPERIMENTAL LIVER CIRRHOSIS.

(Eng.) Gressner, A. M.; Pazen, H.; Greiling, H. (Medical Faculty RWTH, Goethestrasse 27-29, D-51 Aachen, W. Germany). *Experientia* 33(10):1290-1292; 1977.

The synthesis of total and of specific types of glycosaminoglycans (GAG) was studied in explants from chronically injured rat liver at various stages of fibrogenesis. During hepatic fibrogenesis induced by long-term administration of thioacetamide (0.03% in drinking water for 1-7 months), the synthesis of chondroitin 4,6-sulfate was enhanced by 70% and 100% at 1 and 2.5 months, resp., and hyaluronic acid synthesis was increased 5- to 20-fold at various intervals throughout the 7-month period. The formation of heparan sulfate (comprising at least 70% of total liver GAG synthesis) and of a keratan-sulfate-like fraction was stimulated 1.7-fold. The formation of dermatan-sulfate in the liver was not detected. This may be due either to inappropriate conditions used, or it might reflect an exceptional metabolism of this type of GAG. The studies show that the rate of synthesis of individual GAG in normal and diseased liver is very unequal.

1900 PRIMARY BILIARY CIRRHOSIS. STUDY OF THE ACTION OF MITOCHONDRIAL ANTIBODY PLUS COMPLEMENT ON MITOCHONDRIAL MEMBRANE FUNCTIONS.

(Eng.) Fernandez-Cruz, E.; Bootello, A.; Blanco, M. F.; Gosalvez, M.; Segovia de Arana, J. M. (Servicio de Immunologia, Clinica Puerta de Hierro, San Martin de Porres, Madrid-35, Spain). *Allergol. Immunopathol. (Madr.)* 4(2):145-152; 1976.

To determine the possible pathogenic role of humoral antibodies reacting with subcellular organ antigens in primary biliary cirrhosis, whole rat liver mitochondria were exposed to mitochondrial antibodies from patients with primary biliary cirrhosis and to antibodies induced in rabbits to rat liver mitochondrial antigens. Mitochondrial respiratory control and oxidative phosphorylation were not significantly altered by incubation of the whole mitochondria with rabbit or human normal or IgG; the results did not change after the addition of complement. Incubation of submitochondrial particle suspensions with normal or immune human or rabbit IgG, using succinate and NADH as substrate, also had no effect on mitochondrial respiration. Again, the addition of complement did not alter the results. ATPase activity and the swelling and contraction of intact mitochondria were not affected by the incubation procedures. The results suggest that mitochondrial antibodies do not play an important role in the pathogenesis of primary biliary cirrhosis.

1901 INHIBITION OF Na^+, K^+-ADENOSINETRIPHOSPHATASE BY ENDOTOXIN: A POSSIBLE MECHANISM FOR ENDOTOXIN-INDUCED CHOLESTASIS. (Eng.)

Utili, R.; Abernathy, C. O.; Zimmerman, H. J. (Clinica delle Malattie Infettive, I Facolta di Medicina, Universita di Napoli, Via Cotugna 1, Napoli 80135, Italy). *J. Infect. Dis.* 136(4):583-587; 1977.

To examine the possibility that the cholestatic effect of *Escherichia coli* or *Salmonella enteritidis* endotoxin might be mediated by the inhibition of the Na^+,K^+-ATPase of the canalicular membrane, the effects of lipopolysaccharides (LPS) of *E. coli* and *S. enteritidis* on the Na^+,K^+-adenosine triphosphatase (ATPase) in canalicular-enriched plasma membranes were examined in the rat liver. At 20 μg/ml, both endotoxins inhibited this enzyme by approximately 40%. Maximal inhibition (70-80%) occurred at concentrations of 120 μg/ml or greater. The LPS of neither organism had any effect on the activity of Mg^{++}-ATPase or 5'-nucleotidase in the same preparations. Inhibition by the *E. coli* LPS appeared to be noncompetitive in nature, and the calculated K_i was 45 μg/ml. Since the Na^+,K^+-ATPase may be responsible for the elaboration of the bile salt-independent fraction, inhibition of this enzyme could be the underlying mechanism for endotoxin-induced cholestasis.

1902 STUDIES ON DRUG-INDUCED CHOLESTASIS: EFFECT OF ETHINYL ESTRADIOL ON HEPATIC BILE ACID RECEPTORS AND (Na^+-K^+)-ATPase. (Eng.)

Simon, F. R.; Sutherland, E.; Accatino, L.; Vial, J.; Mills, D. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* University Park Press (Baltimore, MD): 133-143; 1977.

Since ethinyl estradiol administration reduces bile acid transport and bile acid-independent bile flow, the effect of its administration on hepatic ultrastructure, bile acid binding parameters, and the activity of (Na^+-K^+)-ATPase activity was examined. Following administration of ethinyl estradiol (5 mg/kg/day, 5 days), both scanning as well as electron microscopy demonstrated a normal bile canalicular membrane appearance. In addition, the number of sites and dissociation constant for specific binding of $[^{14}C]$cholic acid to liver surface membranes isolated from ethinyl estradiol-treated rats were unaltered compared to controls. In contrast, (Na^+-K^+)-ATPase was reduced to 46% of the control value, consistent with reduced bile flow (61% of control). Simultaneous administration of phenobarbital (80 mg/kg/day) with ethinyl estradiol prevented reductions in both bile flow and (Na^+-K^+)-ATPase. These studies demonstrate that ethinyl estradiol reduces hepatic (Na^+-K^+)-ATPase activity consistent with its role in regulation of bile salt-independent bile flow. Failure to demonstrate alterations in the initial step in bile acid transport suggest that abnormalities in translocation such as altered ion gradients or changes in the surface membrane lipid environment may be responsible for decreased bile acid transport.

1903 HEPATITIS B e ANTIGEN AND INFECTIVITY OF HEPATITIS B VIRUS. (Eng.)

Shikata, T.; Karasawa, T.; Abe, K.; Uzawa, T.; Suzuki, H.; Oda, T.; *et al.* (Nihon Univ. Sch. Medicine, 30 Kamimachi Oyaguchi Itabashi-ku, Tokyo, 173 Japan). *J. Infect. Dis.* 136(4):571-576; 1977.

To confirm the difference in the infectivity of hepatitis B surface antigen (HBsAg)-positive serum according to differences in the e antigen system, four chimpanzees were inoculated i.v. with serum positive for hepatitis B e antigen (HBeAg), and three chimpanzees were inoculated with serum positive for antibody to HBeAg (anti-HBe). Since the infectivity titrations are not yet completed, the end infectivity titer of each serum is not known. All four chimpanzees that received 10^{-1}, 10^{-4}, or 10^{-8} dilutions of HBeAg-positive serum developed hepatitis B virus infection, whereas the one animal injected with undiluted anti-HBe-positive serum became infected, and other chimpanzees injected with diluted anti-HBe-positive sera did not. As judged from the length of the incubation period before appearance of HBsAg in blood, there was a remarkable difference in infectivity between the HBeAg-positive serum and the anti-HBe-positive serum; the former serum was 10^8 times more infectious than the latter. This study confirms the infectivity of HBsAg-positive serum containing anti-HBe and the difference in the infectivity depending upon whether HBeAg or anti-HBe is present.

1904 EARLY EFFECTS OF HYPERVITAMINOSIS A ON GLUCONEOGENIC ACTIVITY AND AMINO ACID METABOLIZING ENZYMES OF RAT LIVER. (Eng.)

Dileepan, K. N.; Singh, V. N.; Ramachandran, C. K. (Vallabhbhai Patel Chest Inst., Univ. Delhi, Delhi-110007, India). *J. Nutr.* 107(10):1809-1815; 1977.

The effects of feeding retinyl palmitate to young rats (80-100 g) on the incorporation of ^{14}C-labeled precursors into glucose and glycogen by liver slices, the levels of amino acids in blood and tissues, and the activities of some important amino acid catabolizing enzymes in the liver were investigated. The rats received 30,000 IU of retinyl palmitate daily for 2 days. A stimulation of hepatic gluconeogenesis in hypervitaminosis A was indicated by the increased incorporation of ^{14}C-labeled alanine and bicarbonate into glucose and glycogen by liver slices. Excessive intake of retinol caused a marked increase in the activities of hepatic alanine aminotransferase and ornithine aminotransferase and a decrease in that of tryptophan pyrrolase, without affecting those of tyrosine aminotransferase and serine dehydratase. The ratio of NADH:NAD in the livers of rats fed excess retinol was significantly increased. The enhancement of gluconeogenesis seen in hypervitaminosis A is caused by a stimulation of gluconeogenic activity of the liver.

1905 EFFECT OF INTERMITTENT PHOTOTHERAPY ON BILIRUBIN DYNAMICS IN GUNN RATS.

(Eng.) Vogl, T. P.; Cheskin, H.; Blumenfeld, T. A.; Speck, W. T.; Koenigsberger, M. R. (Box 4, Babies Hosp., 630 W. 168th St., New York, NY 10032). *Pediatr. Res.* 11(10, Part 1):1063-1068; 1977.

To determine whether continuous phototherapy is necessary to control neonatal jaundice, groups of jaundiced (Gunn) rats were exposed to four blue-light regimens: continuous light, 30 min light/30 min dark, 6 min light/6 min dark, and 6 min light/18 min dark. An exponential decrease in serum bilirubin concentration (SBC) was found with all regimens. A logarithmic dose response curve was obtained with a 50% light dose exhibiting 75% efficacy, and a 25% light dose exhibiting 59% efficacy compared to continuous phototherapy. The time constants of the decrease in serum bilirubin concentration also varied logarithmically with doses, with continuous therapy having a time constant of 1.4 days, and 6 min light/18 min dark therapy having a time constant of 3 days. It is concluded that, for adult Gunn rats, and probably for neonates, an optimum combination of light intensity and on/off cycle time exists that represents a therapy regimen that produces optimal therapeutic benefit while minimizing total light dosage.

1906 EFFECT OF RENAL ISCHAEMIA IN RATS WITH OBSTRUCTIVE JAUNDICE.

(Eng.) Craddock, G. N.; Lee, E. (Addenbrooke's Hosp., Cambridge, England). *Ann. R. Coll. Surg. Engl.* 59(5):409-414; 1977.

The quantitative relationship between obstructive jaundice and renal susceptibility to ischemia was investigated in female white Wistar rats. The bile ducts of 51 rats were ligated, while those of another 51 were unligated. All animals experienced occlusion of the left kidney one week later for periods of 0-230 min. Three weeks later, the right kidney was removed. Nonjaundiced animals had a mean right kidney weight of 0.394 ± 0.024% of body weight when no left renal ischemia was imposed; the right kidney was 0.519 ± 0.034% of body weight after 230 min of left renal ischemia. Jaundiced rats displayed a mean right kidney weight of 0.470 ± 0.050% of body weight without ischemia and 0.589 ± 0.054% with maximal compensatory hypertrophy. Both jaundiced and nonjaundiced animals had a LD_{50} of renal ischemia of 120 min after delayed opposite nephrectomy. These results show no significant difference between the two groups of animals, except the marked increase in renal weight in the presence of jaundice. No significant difference in susceptibility to renal ischemia could be demonstrated in rats with or without obstructive jaundice.

1907 THE ACCELERATION OF HEPATIC REGENERATION BY PRIOR LAPAROTOMY.

(Eng.) Sakamoto, Y.; Jehn, D.; Nicolson, M. O.; Ohashi, E.; Hays, D. M. (Univ. Southern California Sch. Medicine, 4650 Sunset Blvd., Los Angeles, CA 90027). *J. Surg. Res.* 23(5):306-310; 1977.

The effect of laparotomy, carried out as a "stress" procedure, prior to partial hepatectomy on liver regeneration was studied in male Fischer rats. Laparotomy consisted of a 5.5-cm mid-line lower abdominal incision with mobilization of the viscera for 5 min. Laparotomy, carried out 6 hr prior to 68% hepatectomy, accelerated the initial rise and first peak of DNA synthesis by approximately 3 hr and the second peak by approximately 6 hr. The effect was most striking in the 16-hr post-resection liver in which [^{3}H]thymidine incorporation in animals stressed by prior laparotomy was >25 times that found in unstressed animals. These studies suggest that an initial phase of the response to hepatic resection may be initiated by nonspecific trauma that is of sufficient magnitude and administered at an appropriate interval prior to hepatectomy.

1908 GLIAL CHANGES IN PIGS WITH PORTO-CAVAL ANASTOMOSIS AND TEMPORARY OR TOTAL HEPATIC ARTERY CLAMPING.

(Eng.) Diemer, N. H.; Tonnesen, K. (Inst. Neuropathology, Univ. Copenhagen, 11 Frederik V's Vej, DK-2100 Copenhagen O, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85(5):721-730; 1977.

To investigate neurological changes in hepatic encephalopathy and in portacaval anastomosis (PCA), the number and size of astrocyte, oligodendrocyte, and neuron nuclei were determined in the cortex and corpus striatum (putamen) of pigs with PCA and total or temporary clamping of the hepatic artery. Animals with PCA and total clamping became comatose and died on average 18.5 hr postoperatively. Their brains showed slight edema but no changes in the glial and neuron nuclear numbers. Animals with PCA and temporary clamping of the hepatic artery (30-60 min) all survived without developing encephalopathy. However, the brains showed vacuolization of the deeper cortical layers, diffuse occurrence of Alzheimer type II astrocytes, and the counts revealed an increased number of astrocytic nuclei. The total number of glial cells decreased due to loss of oligodendrocytes, but the number of neurons was unchanged. The findings indicate that the neuropathological changes after PCA and temporary hepatic artery clamping are concerned primarily with changes of the glial cells.

1909 THE MECHANISM OF POSTSHUNT LIVER FAILURE.

(Eng.) Reichle, F. A.; Rao, N. S.; Reichle, R. M.; Chang, K. H. Y. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140). *Surgery* 82(5):738-749; 1977.

To investigate the mechanism of postshunt liver failure, postoperative hepatic mass, body weight, ammonia clearance, hepatic urea cycle enzyme activity, and hepatic protein metabolism were determined in 59 dogs that underwent sham operation, end-to-side portacaval shunt, mesocaval shunt with subsequent end-to-side portacaval shunt, distal splenorenal shunt, caval left portal shunt, or portal venous segregation with jugular vein interposition. Compared to total shunt, selective diversion of portal blood from the liver produced less post-shunt liver atrophy, less body weight loss, improved maintenance of urea cycle enzyme activity, improved ammonia tolerance, and less decrease in hepatic DNA, RNA, and protein content. Segregation of left from right hepatic lobes, in relation to portal or systemic venous hepatic perfusion or in relation to gastroduodenopancreaticosplenic or intestinal portal venous drainage, caused little change in enzyme or protein metabolism in respective hepatic lobes.

1910 CHANGES IN THE ACTUAL OXYGEN LEVEL OF THE LIVER DURING BARBITURATE-HALOTHANE ANESTHESIA. (Ger.) Szelenczy, M.; Kiss, T. (Second Surgical Clinic, Pecs Medical Univ., Pecs, Hungary). *Z. Exp. Chir.* 10(3):156-160; 1977.

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(Eng.) Bochenek, W. J.; Rodgers, J. B. (Albany Medical Coll., Albany, NY). *Gastroenterology* 72 (5, Part 2):1178; 1977.

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1958 PHENOTYPIC ALTERATION OF SUSCEPTIBILITY IN GENETICALLY SUSCEPTIBLE MICE TO MOUSE HEPATITIS VIRUS BY CONCANAVALIN A [Abstract]. (Eng.) Weiser, W. Y.; Bang, F. B. (Johns Hopkins Univ. Sch. Hygiene and Public Health, Baltimore, MD 21205). *Fed. Proc.* 36(3):1190; 1977.

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Holland, R. K.; Groufsky, A. K. (Dept. Surgery, Univ. Otago, Dunedin, New Zealand). *Aust. N.Z. J. Surg.* 47(1):110; 1977.

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1961 REVERSIBLE MODIFICATIONS OF BRAIN NEUROTRANSMITTERS IN EXPERIMENTAL ACUTE HEPATIC COMA [Abstract]. (Eng.) Opolon, P.; Delorme, M. L.; Rapin, J. R.; Bloch, P.; Boschat, M. (INSERM, U 9, 184, rue du Faubourg-Saint Antoine, 75012 Paris, France). *Digestion* 15(5):443-444; 1977.

1962 EFFECTS OF OXYGEN ON HEXOBARBITAL SLEEPING TIME IN PHENOBARBITAL AND CARBON TETRACHLORIDE TREATED RATS [Abstract]. (Eng.) Abrams, R. H.; Ashkin, J. R.; Soloway, R. D. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1176; 1977.

1963 EVIDENCE FOR INCREASED SENSITIVITY OF THE BRAIN TO SEDATIVES IN PORTAL SYSTEMIC ENCEPHALOPATHY: STUDIES IN THE RAT WITH PORTACAVAL ANASTOMOSIS [Abstract]. (Eng.) Bircher, J.; Kupfer, A. (Dept. Clinical Pharmacology, Univ. Berne, Murtenstrasse 35, CH-3010 Berne, Switzerland). *Digestion* 15(5):439-440; 1977.

See also, 1727, 1736, 1779, 1800, 1814, 1986, 1992, 2037, 2221, 2432, 2452, 2472, 2492, 2515, 2524, 2534, 2535, 2588.

SECRETION AND METABOLISM

Intestine

1964 DEVELOPMENT OF SUBSTRATE CYCLE ENZYMES IN THE HAMSTER SMALL INTESTINE. (Eng.) Schiller, C.; Walden, R. (Natl. Inst. Environmental Health Sciences, P.O. Box 12233, Research Triangle Park, NC 27709). *Dev. Biol.* 60(1):130-138; 1977.

The patterns of development of four substrate cycle enzymes, assayed from intestinal tissue subcellular fractions of Syrian fetal, neonatal, and adult LVG/LAK hamsters were studied. NAD-linked L-glycerol-3-phosphate dehydrogenase (NAD-G_3PDH), flavoprotein-linked L-glycerol-3-phosphate dehydrogenase (Fp-G_3PDH) L-malate dehydrogenase (MDH), and GOT were measured in the mitochondria and/or the cytosol by spectrophotometry. Cytosolic NAD-G_3PDH activity increased from low fetal levels (0.0140 ± 0.0021 mmol/min/mg) to a maximum level 7 days after birth (0.1000 ± 0.0428 mmol/min/mg), and then decreased to adult levels (0.0695 ± 0.0053 mmol/min/mg). Mitochondrial Fp-G_3PDH activity increased at 7 days after birth (0.0219 ± 0.0035 mmol/min/mg) to levels slightly lower than those of adults (0.0228 ± 0.0054 mmol/min/mg). MDH in both the cytosol and mitochondrial fractions increased from fetal levels (1.35 ± 0.15 and 3.80 ± 0.45 mmol/min/mg, resp.) comparable to adult levels to a postnatal peak (2.81 ± 0.20 and 6.85 ± 0.74 mmol/min/mg, resp.). GOT activity in both subcellular fractions was high prenatally (0.131 ± 0.015 and 0.558 ± 0.035 mmol/min/mg, resp.), with a postnatal peak at 7 days (0.197 ± 0.028 and 0.459 ± 0.107 mmol/min/mg, resp.), at which time it declined to adult levels (0.121 ± 0.009 and 0.225 ± 0.034 mmol/min/mg, resp.). These results indicate that the 7-day postnatal period represents a peak in mitochondrial and cytosolic enzyme development.

1965 PATHOGENESIS OF MUCOSAL INJURY IN THE BLIND LOOP SYNDROME: BRUSH BORDER ENZYME ACTIVITY AND GLYCOPROTEIN DEGRADATION. (Eng.) Jonas, A.; Flanagan, P. R.; Forstner, G. G. (Hosp. Sick Children, Toronto, Canada). *J. Clin. Invest.* 60(6):1321-1330; 1977.

The effect of surface damage in intestinal bacterial overgrowth on brush border hydrolases and brush border glycoproteins was studied in nonoperated control rats, control rats with surgically introduced jejunal self-emptying blind loops, and rats with surgically introduced jejunal self-filling blind loops. Data were analyzed from blind loop segments, segments above and below the blind loops, and three corresponding segments in the nonoperated controls. Rats with self-filling blind loops had significantly greater fat excretion (6.9 ± 1.3% of intake) than nonoperated controls (2.1 ± 0.3%, $p<0.001$) or controls with self-emptying loops (2.7 ± 0.1%, $p<0.01$) and exhibited significantly lower conjugated:free bile salt ratios in all three segments. Maltase, sucrase, and lactase activities were significantly reduced in homogenates and isolated brush borders from the self-filling blind loop, but alkaline phosphatase was not affected. The relative degradation rate of homogenate and brush border glycoproteins was assessed by a double-isotope technique involving the injection of D-[6-^{3}H]glucosamine at 3 hr and D-[U-^{14}C]glucosamine at 19 hr before sacrifice and was recorded as a ^{3}H:^{14}C ratio. The relative degradation rate in both homogenate and brush border fractions was significantly greater in most segments from rats with self-filling blind loops. In the upper and blind loop segments from rats with self-filling blind loops, the ^{3}H:^{14}C ratios were higher in the brush border membrane than in the corresponding homogenates, indicating that the increased rates of degradation primarily involve membrane glycoproteins. The incorporation of D-[6-^{3}H]glucosamine by brush border glycoproteins was not reduced in rats with self-filling blind loops, suggesting that glycoprotein synthesis was not affected. Polyacrylamide gel electrophoresis of brush border glycoproteins from the contaminated segments indicated that the large molecular weight glycoproteins, which include many of the surface hydrolases, were degraded most rapidly. Brush border maltase, isolated by immunoprecipitation, had ^{3}H:^{14}C ratios characteristic of the most rapidly degraded glycoproteins. The results indicate that bacteria enhance the destruction of intestinal surface glycoproteins including disaccharidases. Since alkaline phosphatase is not affected, the destruction is selective and presumably involves only the most exposed membrane components.

1966 REGIONAL LOCALIZATION OF ACTIVITY OF Clostridium perfringens TYPE A ENTEROTOXIN IN THE RABBIT ILEUM, JEJUNUM, AND DUODENUM. (Eng.) McDonel, J. L.; Duncan, C. L. (Dept. Microbiology and Cell Biology, Pennsylvania State Univ., University Park, PA 16802). *J. Infect. Dis.* 136(5): 661-666; 1977.

In an effort to characterize and compare the responses of the three parts of the small intestine to *Clostridium perfringens* enterotoxin for future studies on the mode of action of the toxin, rabbit ileal, jejunal, and duodenal loops were exposed to purified enterotoxin from *C. perfringens* type A and then perfused for comparative analysis of the effects of the enterotoxin on each region of the intestine. Ileal loops responded with enhanced net secretion of fluid and sodium, inhibition of chloride and glucose uptake, and substantial sloughing of epithelial cells. The jejunum responded with fluid secretion, enhancement of sodium secretion (only during the first 20 min), inhibition of chloride and glucose uptake, and substantial sloughing of epithelial cells. In the duodenum, transport of fluid, sodium, and chloride was significantly altered only during the first 20 min of perfusion, and significant inhibition of glucose uptake varied from one period to another. Epithelial damage was much less than that seen in the jejunum or ileum. Levels of fluid protein in all three sections corresponded closely to extent of tissue damage. The severity of response to fixed doses of enterotoxin generally varied as follows: ileum>jejunum>duodenum.

1967 A RABBIT MODEL OF DIARRHEA DUE TO INVASIVE Escherichia coli. (Eng.) Cantey, J. R.; O'Hanley, P. D.; Blake, R. K. (Veterans Admin. Hosp., 109 Bee St., Charleston, SC 29403). *J. Infect. Dis.* 136(5):640-648; 1977.

Rabbits received a nonpiliated strain of invasive *Escherichia coli* of human origin (HInvEC) in doses ranging from 1.5 x 10^8 to 2.5 x 10^{10} bacteria, in an effort to develop a convenient model of *E. coli* (HInvEC) diarrhea. This strain colonized the ileum, cecum, and colon in large numbers for 1-3 days and produced diarrhea in 91 (58%) of the 156 rabbits. A dose of 2.5 x 10^{10} bacteria reliably and repeatedly elicited diarrheal disease in 80% of the animals. The acute pathohistology as determined by light microscopy, transmission electron microscopy, and immune fluorescent microscopy was manifest in the distal ileum, cecum, and colon. Prominent findings included mucosal ulcers, bacterial invasion of the lamina propria, and a polymorphonuclear infiltrate in the lamina propria. Diarrhea due to strain HInvEC was followed by a rise in the titer of serum antibody to O antigen of *E. coli*. Because the rabbit is so well characterized immunologically, this model should be especially valuable in determining the nature of the local immune response and the effects of that response on the infection of the gut by bacteria that cause diarrhea.

1968 REGULATION OF MUCOSAL GROWTH BY GASTRIC AND ILEAL INFUSION OF SINGLE AMINO ACIDS IN PARENTERALLY NOURISHED (TPN) RATS [Abstract]. (Eng.) Spector, M. H.; Traylor, J. B.; Young, E. A.; Weser, E. (Univ. Texas Health Science Center, San Antonio, TX). *Gastroenterology* 72(5, Part 2): 1135; 1977.

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1971 THE ROLE OF UNCONJUGATED BILE SALTS AND BACTERIAL PROTEASES AS CAUSES OF MUCOSAL INJURY IN THE CONTAMINATED BOWEL SYNDROME [Abstract]. (Eng.) Jonas, A.; Krishnan, C.; Forstner, G. (Hosp. Sick Children, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1076; 1977.

1972 CHROMOSOMAL STUDY ON MOUSE INTESTINAL MUCOSAL CELLS, WITH A NOTE ON ABERRATIONS INDUCED BY A CARCINOGEN, MNNG. (Eng.) Tokumitsu, T. (Yakult Inst. Microbiological Res., Kunitachi, Tokyo, Japan). *Proc. Jpn. Acad.* 52(9):513-516; 1976.

1973 COMPARISON OF GASTROINTESTINAL STRUCTURE AND ENZYME ACTIVITY BETWEEN ORALLY FED RATS AND RATS FED BY INTESTINAL INFUSION [Abstract]. (Eng.) Wiseman, D. A.; Copeland, E. M.; Dudrick, S. J.; Castro, G. A. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2):1151; 1977.

1974 MICROVILLUS ENZYME SPECIFIC ACTIVITY ALONG THE LENGTH OF THE SMALL INTESTINE [Abstract] (Eng.) Lane, H. W.; Cerda, J. J. (Dept. Clinical and Community Dietetics and Medicine, Univ. Florida, Gainesville, FL). *Gastroenterology* 72(5, Part 2): 1086; 1977.

1975 DETERMINATION OF ENTEROPEPTIDASE ACTIVITY IN HUMAN DUODENAL ASPIRATES. (Eng.) Barns, R. J.; Elmslie, R. G. (Queen Elizabeth Hosp., Woodville, South Australia 5011, Australia). *Clin. Chim. Acta* 79(1):55-61; 1977.

1976 EFFECTS OF PRENATAL UNDERNUTRITION ON INTESTINAL PHYTASE IN NEWBORN RAT. (Eng.) Ramakrishnan, C. V.; Bhandari, S. D. (Dept. Biochemistry, M. S. Univ. Baroda, Baroda, India). *Nutr. Rep. Intl.* 16(1):147-155; 1977.

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1980 FASTING AND POSTPRANDIAL PLASMA SECRETIN CONCENTRATIONS IN HEALTH AND DISEASE [Abstract]. (Eng.) Straus, E.; Yalow, R. S. (Veterans Admin. Hosp., Bronx, NY). *Gut* 9(1): 66-67; 1977.

1981 ALTERATIONS IN THE CELL-SURFACE MEMBRANE OF THE INTESTINAL EPITHELIAL CELL DURING MITOSIS AND DIFFERENTIATION, AND AFTER NEOPLASTIC TRANSFORMATION. (Eng.) Weiser, M. M. *In: Membranes and Disease.* Edited by L. Bolis, J. F. Hoffman, and A. Leaf. (New York: Raven Press):281-290; 1976.

1982 THE HANDLING OF H^+ BY THE COLON: THE BIOPHYSICAL ASPECT OF ESOPHAGEAL REPLACEMENT. (Eng.) Chung, R. S. K.; Johnson, G. M.; Denbesten, L. (Veterans Admin. Hosp., Iowa City, IA 52240). *J. Surg. Res.* 22(5):538-544; 1977.

See also, 1694, 1695, 1696, 1697, 1702, 1708, 1713, 1714, 1718, 1728, 1732, 1738, 1801, 1840, 1859, 1864, 1869, 1871, 1983, 1984, 1986, 2213, 2229, 2561, 2563, 2597.

GENERAL

1983 HISTAMINE H_1- AND H_2-RECEPTOR VASODILATION OF CANINE INTESTINAL CIRCULATION. (Eng.) Pawlik, W.; Tague, L. L.; Tepperman, B. L.; Miller, T. A.; Jacobson, E. D. (Univ. Texas Medical Sch., Houston, TX 77025). *Am. J. Physiol.* 233(3): E219-E224; 1977.

The local vasodilator response to histamine in the superior mesenteric artery of anesthetized dogs was studied to determine whether the mesenteric vasodilator response to histamine is mediated by H_1 receptors alone or whether H_2 receptors are also involved in the response. The vasodilator response to histamine was inhibited by either the H_1-receptor antagonist, tripelennamine, or the H_2-receptor antagonist, metiamide. Both the H_1 agonist, 2-methylhistamine, and the H_2 agonist, 4-methylhistamine, induced dilator responses in the mesenteric circulation. Two temporal patterns of vasodilation were distinguished: a transient spike and subsequent fade of blood flow (seen with either the H_1 agonist or with histamine after H_2-receptor blockade) and a sustained and stable increase in flow (seen with either the H_2 agonist or with histamine after H_1 blockade). Metiamide appeared to be a potent inhibitor of the mesenteric vasodilator response to histamine at least equal to tripelennamine. The results suggest that the mesenteric vasodilator response to histamine is mediated by both H_1 and H_2 receptors.

1984 THE PROTECTIVE EFFECT OF VANCOMYCIN ON CLINDAMYCIN-INDUCED COLITIS IN HAMSTERS.

(Eng.) Browne, R. A.; Fekety, R., Jr.; Silva, J., Jr.; Boyd, D. I.; Work, C. O.; Abrams, G. D. (Dept. Internal Medicine, Univ. Michigan, Ann Arbor, MI 48109). *Johns Hopkins Med. J.* 141(4):183-192; 1977.

To determine whether changes in intestinal flora have a pathogenetic role in clindamycin-associated colitis and are influenced by p.o. nonabsorbable antibiotics, the effect of vancomycin on clindamycin-induced colitis was studied in hamsters. Vancomycin significantly prolonged survival and sometimes prevented death in clindamycin-treated (100 mg/kg, s.c.) hamsters, even if treatment was delayed until 48 hr after clindamycin challenge. Oral vancomycin was more protective than s.c. vancomycin in comparable doses (200 μg/ml in drinking water; 3 mg, s.c.). Vancomycin itself was frequently lethal to hamsters, but the mechanism of toxicity was unclear. Histologic studies demonstrated that vancomycin prevented clindamycin-induced intestinal lesions, although similar lesions frequently evolved after treatment with vancomycin was discontinued. Hamsters given a single injection of clindamycin and subsequently treated with continuous p.o. vancomycin for as long as 12 weeks often died after vancomycin was stopped, with lesions indistinguishable from those seen in clindamycin-induced enterocolitis. Oral vancomycin was not significantly absorbed from the intestinal tract of hamsters. Bacteremia was frequent in clindamycin-treated hamsters in the 72 hr post-challenge, and the incidence of bacteremia was unchanged by p.o. vancomycin. In humans, p.o. vancomycin is nontoxic and may be useful in prevention or treatment of clindamycin-associated colitis.

1985 ELECTROKINETIC PROPERTIES OF LYMPHOCYTES SEPARATED FROM MOUSE PEYER'S PATCHES.

(Eng.) Dumont, F.; Robert, F. (Unit Experimental Cancerology and Radiology, INSERM U-95, Plateau de Brabois, 54500 Vandoeuvre-les-Nancy, France). *Immunology* 33(3):295-303; 1977.

The electrophoretic mobility (EPM) of lymphocyte populations isolated from murine Peyer's patches (PP) was characterized to determine whether bone marrow-derived (B) lymphocytes can be distinguished from thymus-derived (T) cells by their lower EPM, as they can in peripheral lymphoid tissues. Electrokinetic properties were investigated using both analytical and preparative cell electrophoresis, and conventional serologic and mitogenic markers for B and T cells were determined in parallel. In CBA mice, PP cells, which included 44% surface-immunoglobulin positive (sIg+) cells and 23% Thy-1-2-positive cells, were found to be composed of two distinct electrophoretic populations. The major one (66% of PP cells) with a mean EPM of 0.70 μm/sec/V/cm was designated as the low-mobility (LM) population, the other one with a mean EPM of 1.16 μm/sec/V/cm was designated as the high-mobility (HM) population. LM cells were encountered in lower frequency (9%) in B lymphocyte-depleted, PP (5% sIg+) from cyclophosphamide-treated CBA mice but were preponderant (92%) in the B lymphocyte-enriched (80% sIg+) nylon-adherent PP cells. In contrast, HM cells made up the majority of cyclophosphamide-resistant PP cells and of nylon-nonadherent PP cells, which were shown to be enriched in T lymphocytes (70 and 63% Thy-1-2$^+$ cells, resp.). On the other hand, following fractionation of CBA PP cells by free-flow preparative electrophoresis, sIg+ cells were distributed in the LM region and Thy-1-2$^+$ cells in the HM region. Moreover, in T lymphocyte-deficient athymic nude mice, PP cells, which were 70% sIg+, were found to be exclusively of LM type (mean EPM=0.77 μm/sec/V/cm). Thus, although both electrophoretic populations included sIg and Thy-1-2-negative elements, it appears that in murine PP as in spleen, most B lymphocytes are endowed with a low EPM and T lymphocytes with a higher EPM.

1986 EN BLOC TRANSPLANTATION OF THE LIVER, PANCREAS, DUODENUM, SPLEEN, AND KIDNEY IN THE RAT.

(Eng.) Maki, T.; Sakai, A.; Pettirossi, O.; Kountz, S. L. (Downstate Medical Center, Brooklyn, NY 11203). *Transplantation* 24(4):256-262; 1977.

The fate of the liver, pancreas, duodenum, spleen, and kidneys from (Lewis x Brown Norway)F_1 rats was studied after they were transplanted simultaneously as an *en bloc* graft to Lewis recipients. No immunosuppression was given postoperatively. Serial laparotomies were performed for macroscopic examination and biopsies of the grafts. Macroscopically, the first evidence of rejection was splenic enlargement followed by fatty metamorphotic change of the liver, dilation and loss of peristalsis of the duodenum, and injection and edema of the pancreas. The kidneys maintained normal color and consistency until late in the rejection process. Histological examination suggested that the liver and the spleen may be more vulnerable to immune attack, since in these organs cellular infiltration started earlier and was more extensive in comparison to other organs. While the pancreas exhibited a typical, although somewhat delayed rejection pattern, the kidneys seemed to maintain a well preserved structure. The duodenum showed no significant cellular infiltration throughout the postoperative period of examination, despite severe mucosal destruction. These findings indicate that the five organs are subject to different modes of rejection when transplanted simultaneously as an *en bloc* graft.

1987 GIARDIASIS IN NUDE MICE: CLUES TO BOTH THYMUS-DEPENDENT AND INDEPENDENT HOST DEFENSE MECHANISMS [Abstract].

(Eng.) Stevens, D. P.; Frank, D. M.; Mahmoud, A. A. F. (Dept. Medicine, Case Western Reserve Univ., Cleveland, OH). *Clin. Res.* 25(4):574A; 1977.

1988 EFFECTS OF MARGINAL PROTEIN MALNUTRITION ON PARASITIC INFECTION OF THE INTESTINE [Abstract].

(Eng.) Tomkins, A. M.; Madi, K.; Ogilvie, B. M. (London Sch. Hygiene and Tropical Medicine, London, England). *Gut* 18(11):A970; 1977.

1989 FLUORESCENCE METHODS IN THE STUDY OF THE GASTRIC PARIETAL CELL [Abstract]. (Eng.) Stave, R.; Brandtzaeg, P. (Natl. Hosp. Norway, Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):102; 1977.

1990 SERUM CONCENTRATIONS OF TRIMIPRAMINE (SURMONTIL) AFTER PERORAL ADMINISTRATION IN HEALTHY HUMANS [Abstract]. (Eng.) Myren, J.; Schrumpf, E.; Skaug, O. E.; Bohman, T. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):63; 1977.

1991 THE EFFECTS OF ACUTE ALCOHOL ADMINISTRATION ON PLASMA PYRIDOXAL 5'-PHOSPHATE (PLP) [Abstract]. (Eng.) Parker, T. H.; Marshall, J. P.; Roberts, R. K.; Schiff, E. R.; Wilkinson, G. R.; Wang, S.; Schenker, S. (Vanderbilt Univ. Sch. Medicine, Nashville, TN). *Clin. Res.* 25(4):573A; 1977.

1992 BILE ACID, NEUTRAL STEROL, AND FAECAL FAT EXCRETION IN SUBJECTS TREATED WITH FENFLURAMINE [Abstract]. (Eng.) Sian, M. S.; Rains, A. J. H. (Charing Cross Hosp. Medical Sch., London, England). *Gut* 18(11):A951; 1977.

1993 STUDIES ON THE VULNERABILITY OF FAT CELLS BY PANCREATIC LIPASE [Abstract]. (Eng.) Schmitz-Moormann, P. (Dept. Pathology, Univ. Marburg, Marburg, W. Germany). *Scand. J. Gastroenterol.* 11(Suppl. 41):94; 1976.

See also, 1718, 1738, 1779, 1875, 1960, 1972, 1999, 2550, 2579, 2600.

DIAGNOSTIC PROCEDURES

1994 DIAGNOSTIC ACCURACY OF FIBERENDOSCOPY IN THE DETECTION OF UPPER INTESTINAL MALIGNANCY. A FOLLOW-UP ANALYSIS. (Eng.) Dekker, W.; Tytgat, G. N. (St. Elisabeth's of Groote Gasthuis, Boerhaavelaan 22, Haarlem, Netherlands). *Gastroenterology* 73(4, Part 1):710-714; 1977.

The accuracy of fiberendoscopy with directed biopsy in the detection of upper intestinal malignancies has been evaluated by studying the operative or postmortem findings or the clinical follow-up data after at least 1 yr and, for relevant lesions, after 2 or 3 yr, in 990 patients. There were no false-positive diagnoses of malignancy in the 167 patients diagnosed fiberendoscopically to harbor an upper intestinal malignancy, and only 2 false-negative diagnoses in the 829 patients with either a benign lesion or an endoscopically normal mucosa. Seven of the 135 adenocarcinomas of the stomach turned out to be early gastric cancers. The two missed malignancies were interpreted initially as benign gastric ulcers. The over-all endoscopic-bioptic accuracy rate calculated for all patients amounts to 99.8%. Such a high accuracy rate can only be reached provided high numbers of biopsies are taken, and particularly at least 10 of gastric ulcers and of suspicious lesions. Endoscopy alone is not sufficiently reliable in determining the nature of the lesion; an incorrect endoscopic interpretation was made in 7.3% of the ulcerous lesions, and in 8.2% of them no firm conclusion could be reached.

1995 APPRAISAL OF THE ^{14}C-GLYCOCHOLATE ACID TEST WITH SPECIAL REFERENCE TO THE MEASUREMENT OF FAECAL ^{14}C EXCRETION. (Eng.) Scarpello, J. H. B.; Sladen, G. E. (Royal Hosp., West St., Sheffield, England). *Gut* 18(9):742-748; 1977.

The ^{14}C-glycocholate test, including the measurement of marker-corrected fecal ^{14}C, was assessed in 18 normal controls, 21 patients with diarrhea not attributable to altered bile acid metabolism, 12 patients with diverticula of the small intestine, 34 patients with previous resection of ileum and often proximal colon, and 10 established ileostomists. Patients with diverticular disease had increased breath $^{14}CO_2$ excretion, but normal fecal excretion of ^{14}C, and this test was more frequently abnormal than the Schilling test. Ileostomists excreted increased amounts of fecal ^{14}C, even when the ileum was intact and apparently normal. The pattern after resection was complex. Breath ^{14}C output was normal if the ileal resection was less than 25 cm in length, although some of these patients had increased fecal ^{14}C excretion if, in addition, at least 15 cm of proximal colon had been resected or bypassed. Longer ileal resections were associated with increased breath and/or fecal ^{14}C excretion, depending in part on the length of colon resected or bypassed and the 24-hr fecal volume. Fewer than half these patients had both increased breath and fecal excretion of isotope, and fecal ^{14}C alone was occasionally normal with an ileal resection of 50 cm or more. The ^{14}C-glycocholate test was more frequently abnormal than the Schilling test in this group. The use of fecal marker correction had only a minor impact on the results. These data suggest that, in patients with ileal resection, fecal ^{14}C, like fecal weight, is determined by the extent of colonic resection as well as by the amount of ileum resected.

1996 URINARY OXALATE ON A HIGH-OXALATE DIET AS A CLINICAL TEST OF MALABSORPTION. (Eng.) Andersson, H.; Gillberg, R. (Sahlgren's Hosp., S-413 45 Gothenburg, Sweden). *Lancet* 2(8040):677-679; 1977.

To investigate whether the determination of urinary oxalate can replace the determination of fecal fat as a clinical test of malabsorption, 100 g of spinach a day was added to the hospital diet of 54 patients with suspected malabsorption. Hyperoxaluria was found in 38 patients; all of them had steatorrhea No patient with steatorrhea had a urinary oxalate excretion of <40 mg/day. Ten other patients had hyperoxaluria, but the fecal fat determinations were regarded as unreliable in almost all and malabsorption could not be confirmed. In clinical practice, the determination of urinary oxalate after a p.o. load of oxalate could replace fecal fat determination in most patients with suspected malabsorption.

1997 ~~PURIFIED ANTIGEN~~ RADIOIMMUNOASSAY IN SEROLOGICAL DIAGNOSIS OF SCHISTOSOMIASIS MANSONI. (Eng.) Pelley, R. P.; Warren, K. S.; Jordan, P. (Case Western Reserve Univ., Cleveland, OH 44106). *Lancet* 2(8042):781-785; 1977.

A radioimmunoassay was developed for detecting human schistosomiasis with a highly purified *Schistosoma mansoni* egg antigen labeled with ^{125}I. With this assay, 276 sera from two patient populations from St. Lucia and Kenya were analyzed, and the results were compared with those previously obtained by the standard assays on the same St. Lucian sera. The egg antigen, major serologic antigen (MSA_1), has striking immunochemical and species specificity and appears to be the principal antigen responsible for the granulomatous response to *S. mansoni* eggs. This ^{125}I-antigen was tested with 5 μl of patient serum as a potential serodiagnostic test for schistosomiasis. Ninety-two control sera from uninfected St. Vincentian patients were seronegative. In studies on 135 mildly infected St. Lucians, the 5-μl serum $^{125}I-MSA_1$ serodiagnostic test was more sensitive than any tests available at the Center for Disease Control, with 64% of infected children, 83% of adolescents, and 98% of adults being positive. Forty-nine heavily infected Kenyans of all age groups were uniformly (100%) seropositive. Finally, a semiquantitative version of the $^{125}I-MSA_1$ radioimmunoassay that uses 0.5 μl of patient sera demonstrated quantitatively significant differences among age-matched and intensity-matched groups of patients with *S. mansoni*, *S. haematobium*, and *S. japonicum* infections. The highly sensitive complement-fixation and indirect-immunofluorescence tests have completely failed to differentiate *S. mansoni* from *S. haematobium* infections.

1998 ARTERIOGRAPHY IN PERITONITIS AND ILEUS. (Ger.) Levendjuk, A. M. (Res. Inst. General Emergency Surgery, 19, Vjezd Balakireva 1, Kharkov, USSR). *Radiol. Diagn.* 18(2):195-203; 1977.

Arteriographic changes caused by peritonitis (induced by ligation of the vermiform appendix) and ileus (induced by obturation or strangulation of the intestine) were studied in 100 adult dogs. Angiography revealed considerable changes in the local blood circulation (reduction of the linear velocity and of the flow volume) in experimental peritonitis and ileus. Constriction of the arteries was a common feature of peritonitis and ileus. The regional hemodynamic changes were most consistently pronounced in ileus caused by strangulation; the changes increased gradually in ileus caused by obturation, after which they showed a tendency toward normalization. In peritonitis, the disturbances in blood circulation were aggravated in parallel with the course of the disease; the blood flow volume dropped to a very low level at the terminal stage of peritonitis.

1999 A NON-INVASIVE TEST OF GASTRIC FUNCTION. (Eng.) Taylor, T. V.; Bone, D.; Torrance, B. (Royal Infirmary, Edinburgh, Scotland). *Br. J. Surg.* 64(10):702-708; 1977.

The results of a new, noninvasive test of gastric secretory function using ^{99m}Tc-pertechnetate are presented. Fifteen minutes after the administration of pentagastrin (6 μg/kg, i.m.) to fasted patients, ^{99m}Tc (1 mCi, i.v.) is administered, and dynamic images produced by a gamma camera are taken at 2, 10, 15, and 30 min. In a normal subject, 5.8% of the injected dose was inside the stomach after 30 min, and a clear gastric image was obtained. Scans of a patient who had undergone total gastrectomy revealed no image formed, no appreciable fall off of background activity, and zero intragastric activity. With pernicious anemia, a poor gastric outline was present, with only 1% activity recorded after 30 min. Patients with stomach fundus carcinoma showed gastric activity of 1.8% of the total dose after 30 min. A mean activity of 7.4 ± 2.5% of the dose was recorded for patients with duodenal ulcers ($p < 0.05$). A false-negative scan was obtained from a patient with dermatitis herpetiformis and celiac disease. Although these findings are preliminary, this appears to be a convenient, noninvasive technique for assaying gastric function proportional to acid output without losses due to incomplete aspiration or gastric emptying.

2000 A REAPPRAISAL OF CLINICAL, ROENTGENOGRAPHIC AND ENDOSCOPIC FEATURES OF THE ZOLLINGER-ELLISON SYNDROME. (Eng.) Regan, P. T.; Malagelada, J. R. (Mayo Clinic, Rochester, MN). *Mayo Clin. Proc.* 53(1):19-23; 1978.

The clinical, roentgenographic, and endoscopic features of 40 patients with Zollinger-Ellison syndrome were evaluated in an attempt to update the diagnostic criteria of this entity. The patient group (26 without prior gastric surgery, 9 with vagotomy and partial gastrectomy, 2 with partial gastrectomy, and 3 with vagotomy and pyloroplasty) exhibited at least two of the following three criteria: (1) hypergastrinemia (gastrin serum levels >300 pg/ml), (2) gastric hypersecretion (basal acid output >15 mEq in previously unoperated patients, >5 mEq in patients with prior gastric surgery), or (3) histopathologic demonstration of an endocrine-type tumor at operation. Sixty percent of the patients were men, and the mean age was 50.5 yr. The mean duration of gastrointestinal symptoms (abdominal pain, diarrhea, or bleeding) prior to diagnosis was 77.9 months. In one-half of the patients with Zollinger-Ellison syndrome, the clinical, roentgenographic, and endoscopic findings were similar to those indicating duodenal ulcer or erosive duodenitis. In conclusion, along with clinical, roentgenographic, and endoscopic studies, routine diagnostic use of serum gastrin radioimmunoassay and gastric analysis is suggested for a more efficient diagnosis of this syndrome.

2001 COMPARISON OF ULTRASOUND AND COMPUTER-ASSISTED TOMOGRAPHY IN PANCREATIC DIAGNOSIS. (Eng.) Husband, J. E.; Meire, H. B.; Kreel, L. (Royal Marsden Hosp., Downs Rd., Sutton, Surrey, SM2 5PT, England). *Br. J. Radiol.* 50(600): 855-862; 1977.

In 50 patients with suspected pancreatic disease, both ultrasonography and computerized tomography (CT) were performed to confirm the diagnosis. A grey scale ultrasound machine and the prototype of the EMI whole-body scanner were used. Both investigations were carried out on the same day in each patient. The final diagnosis was obtained either by laparotomy, by post mortem, or by strong biochemical or clinical evidence. CT visualized the pancreas in 100% of the patients, whereas ultrasound was successful in 80%. The ultrasound failures were due to bowel gases anterior to the pancreas. The diagnosis in normal patients was correct in 12 of 14 patients when ultrasound examination was performed and in 11 patients using CT. Acute pancreatitis was successfully diagnosed by ultrasonography in six of eight patients. Chronic pancreatitis was correctly diagnosed in eight patients (50%) using ultrasound, while CT demonstrated the disease in 14 of 16 patients. Ultrasound diagnosed only five of nine cases of carcinoma, while CT correctly diagnosed all carcinomas. Both techniques failed to detect lesions in either of two patients with endocrine tumors. Both ultrasonography and CT correctly diagnosed pancreatic lymphoma in one patient with this tumor. If both techniques are available, ultrasound may be used as a screening procedure from which about 15% of patients may be referred for other diagnostic procedures, including CT.

2002 PREOPERATIVE DIAGNOSIS OF PANCREATIC CARCINOMA BY PERCUTANEOUS ASPIRATION BIOPSY. (Eng.) Goldman, M. L.; Naib, Z. M.; Galambos, J. T.; Rude, J. C., III; Oen, K. T.; Bradley, E. L., III; *et al.* (Grady Memorial Hosp., 80 Butler St., S.E., Atlanta, GA 30303). *Am. J. Dig. Dis.* 22 (12):1076-1082; 1977.

Percutaneous aspiration biopsy was used in the preoperative differential diagnosis of pancreatic carcinoma and pancreatitis in 13 patients with suspected pancreatic malignancies. The pancreatic cancer was localized for aspiration biopsy by the combination of ultrasonography and angiography or cholangiography. The skin directly overlying the main portion of the pancreatic mass (as determined by ultrasonography) was punctured with a Chiba needle, and under fluoroscopic guidance, the needle was directed to the region of abnormal vessels seen by angiography. In all of the 13 aspirations that were performed, recognizable pancreatic glandular and duct cells were obtained. Carcinoma of the pancreas was documented by angiography, clinical follow-up, or by histology in 11 patients. In six of these patients, adenocarcinoma was confirmed. In a seventh patient, the cytological material was suspicious of cancer. One positive finding was from a patient with a small tumor less than 3 cm in diameter localized in the head of the pancreas. The other positive findings were from patients with tumors ranging in diameter from 3 to over 6 cm. In the four patients in whom aspiration biopsy was not diagnostic, the carcinoma was large in one, moderate in one, and small in two. Following percutaneous aspiration biopsy, none of the 13 patients had clinical or laboratory evidence of pancreatitis or worsening of their clinical condition. Percutaneous aspiration biopsy appears to be a safe procedure that should be considered in the evaluation of patients with suspected pancreatic malignancy in which a mass lesion is demonstrated by ultrasonography, computerized tomography, angiography, or retrograde pancreatography.

2003 DUODENOSCOPIC GUIDED BIOPSY OF THE BILIARY AND PANCREATIC DUCT. (Eng.) Seifert, E.; Urakami, Y.; Elster, K. (1. Med. Klinik, Stadt. Krankenhaus Kemperhof, D-5400 Koblenz, W. Germany). *Endoscopy* 9(3):154-161; 1977.

A specially designed forceps was used to perform duodenoscopic guided biopsy of the biliary and pancreatic duct in 11 patients. The special forceps, which has a tip that can be bent like an ordinary intubation cannula, was inserted via the instrumentation channel of the duodenofiberscope into the papilla of Vater and was guided to the lesion by fluoroscopy. When the lesion was reached, the biopsy was taken in the usual way. The method was used to gain histological material in 10 of the 11 patients examined. In one case, the forceps could not be inserted into the papilla. The method gave good and representative results in the biliary duct and from the papilla. Biopsies taken from inside of carcinomatous papillae gave, in both cases, positive results; also, a case of adenomyomatosis of the papilla of Vater was confirmed histologically. The technique also allowed for the differentiation of a gallstone in the cystic duct from a possible tumorous lesion. In the pancreatic duct, however, the guided biopsy technique did not aid in the differential diagnosis of benign or malignant lesions. In three out of four cases of verified pancreatic cancer, the histological diagnosis was false-negative, probably because the tumor mass was not reached. An advantage of the guided biopsy over cytological examination is that the intraluminal forceps can biopsy lesions involving infiltration of the deeper layers of the lumen wall or superficial spreading over the surface of the ducts; the criteria of malignancy rest on the manner of proliferation rather than on the nature of the individual cell. The biopsy specimens are very small and need an exact preparation. Orientation of the specimen in the paraffin block and the direction of section are critical factors for proper evaluation, as is a knowledge of the exact location from which the specimen was obtained.

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2051 A NEW DIMENSION IN GASTRODUODENAL EXAMINATIONS WITH MANUALLY CONTROLLED STANDS--CRANIAL AND CAUDAL PROJECTIONS. (Eng.) Persyn, M. J. (H. Hartkliniek, Roeselare, Belgium). *Medicamundi* 21(3):150-158; 1976.

2052 NEWER RADIOLOGICAL TECHNIQUES IN THE DIAGNOSIS OF GASTROINTESTINAL CANCER. (Eng.) Dodd, G. D.; Goldstein, H. M. (No affiliation given). *Clin. Gastroenterol.* 5(3):597-624; 1976.

2053 COMPUTERIZED TOMOGRAPHY. (Eng.) Hounsfield, G. N. *In: Topics in Gastroenterology*. Edited by S. C. Truelove and J. A. Ritchie. (Oxford: Blackwell Scientific Publications):(4): 299-308; 1976.

2054 RADIOLOGIC DIAGNOSIS OF DISORDERED ESOPHAGEAL MOTILITY. A UNIFIED PHYSIOLOGIC APPROACH. (Eng.) Margulis, A. R.; Koehler, R. E. (Univ. California Sch. Medicine, San Francisco, CA 94143). *Radiol. Clin. North Am.* 14(3):429-440; 1976.

2055 DIAGNOSIS OF LIVER ESOPHAGEAL SPHINCTER (LES) INCOMPETENCE IN INFANTS [Abstract]. (Eng.) Vanderhoof, J. A.; Rapoport, P. J.; Paxson, C. L., Jr. (Univ. Nebraska Medical Center, Omaha, NB). *Gastroenterology* 72(5, Part 2):1144; 1977.

2056 NORMAL AND ABNORMAL MOTILITY OF THE STOMACH. (Eng.) Donner, M. W. (Johns Hopkins Medical Inst., Baltimore, MD 21205). *Radiol. Clin. North Am.* 14(3):441-460; 1976.

2057 THE DIAGNOSTIC SIGNIFICANCE OF RUSSELL BODIES IN ENDOSCOPIC GASTRIC BIOPSIES. (Eng.) Johansen, A.; Sikjar, B. (Bispebjerg Hosp., DK-2400 Copenhagen NV, Denmark). *Acta Pathol. Microbiol. Scand. [A]* 85(2):245-250; 1977.

2058 CLINICAL EVALUATION OF GASTRIN RADIOIMMUNOASSAY. (Eng.) Kumar, M. S.; Caplivski, G.; Deodhar, S. D. (Dept. Immunopathology, Cleveland Clinic, Cleveland, OH). *Lab. Med.* 8(4):6-8, 18; 1977.

See also, 1744, 1850, 1998, 2059, 2076, 2082, 2083, 2093, 2095, 2142, 2204, 2213, 2237, 2242, 2251, 2252, 2278, 2297, 2298, 2299, 2300, 2307, 2308, 2318, 2319, 2321, 2339, 2348, 2395, 2429, 2430, 2436, 2437, 2440, 2442, 2468, 2471, 2475, 2477, 2478, 2483, 2494, 2495, 2499, 2501, 2502, 2503, 2514, 2521, 2527, 2528, 2538, 2547, 2552, 2553, 2575, 2598, 2621, 2623.

GASTROINTESTINAL DISEASES

ESOPHAGUS

2059 TECHNIQUE AND EXPERIENCE WITH 24-HOUR ESOPHAGEAL pH MONITORING IN CHILDREN.

(Eng.) Hill, J. L.; Pelligrini, C. A.; Burrington, J. D.; Reyes, H. M.; DeMeester, T. R. (22 S. Greene St., Baltimore, MD 21201). *J. Pediatr. Surg.* 12(6):877-887; 1977.

A 24-hr pH esophageal monitoring technique was used to evaluate gastroesophageal reflux in two normal control children and in five children with abnormal gastroesophageal reflux. The technique involved positioning a glass pH electrode through the nasopharynx 3 cm proximal to the distal esophageal sphincter. A second reference probe was wrapped on the nondominant forearm of the subject. For the two normal controls, values for the total number of refluxes (9 and 53, resp.); the percentage of time that the pH was less than 4 (0.84% and 2.1%, resp.); the number of refluxes greater than 5 min in duration (0 and 1, resp.); the percentage of reflux time in the supine (0.77% and 1.1%, resp.), upright (0.3% and 1.4%, resp.), and prone positions (1.53% and 1.8%, resp.); and the longest episode in minutes (3 and 16, resp.) revealed considerable variation regardless of age and maturation. A 9-month-old girl suffered frequent episodes of regurgitation and vomiting and underwent a Nissen fundoplication after having her narrowed distal esophagus dilated three times. Pre- and postoperative values were, resp., 131 and 28 for the total number of refluxes; 14% and 0.84% for the percentage of time the pH was less than 4.0; 8 and 0 for the number of refluxes greater than 5 min in duration; 4.14% and 0.54% for the percentage of reflux time in the supine position; 24% and 1.12% for the percentage of reflux time in the upright position; and 22 and 1 min for the longest episode. It is concluded that 24-hr esophageal monitoring has better objectivity, precision, sensitivity, and reliability than contrast studies, endoscopy, esophageal biopsy, acid perfusion, or acid reflux tests. The 24-hr pH monitoring technique assists in the evaluation of sphincter maturation, pulmonary disease, and the significance of body position.

2060 CONGENITAL CRICOPHARYNGEAL ACHALASIA.

(Eng.) Reichert, T. J.; Bluestone, C. D.; Sieber, W. K.; Stool, S. E.; Sieber, A. M. (Children's Hosp. Pittsburgh, 125 DeSoto St., Pittsburgh, PA 15213). *Ann. Otol. Rhinol. Laryngol.* 86(5, Part 1):603-610; 1977.

Anatomical features, physiological aspects, methods of evaluation, clinical course, and recommendations for management are presented in 15 infants with congenital cricopharyngeal achalasia. Although most of the patients had symptoms at birth, the diagnosis was frequently not confirmed until later in the first year of life. While four of the infants had only cricopharyngeal achalasia, 11 had associated diseases related to the central nervous system. Those patients without associated diseases improved spontaneously with conservative management; most of the infants with other abnormalities also improved, although their clinical progress was slower and more complicated. In three patients, the symptoms were persistent, and there were two deaths related to associated diseases. Cricopharyngeal myotomy was carried out in two children with only moderate improvement in symptoms. Congenital cricopharyngeal achalasia is more common than formerly recognized. When suspected, an esophagram with tele- or cineradiography is essential to confirm the diagnosis. Esophageal motility studies will quantify changes and also evaluate lower esophageal dysfunction not easily identified on esophagrams.

2061 LOWER ESOPHAGEAL SPHINCTER DYSFUNCTION IN ESOPHAGEAL ATRESIA: NOCTURNAL REGURGITATION AND ASPIRATION PNEUMONIA.

(Eng.) Shermeta, D. W.; Whitington, P. F.; Seto, D. S.; Haller, J. A. (Johns Hopkins Univ. Sch. Medicine, 601 N. Broadway, Baltimore, MD 21205). *J. Pediatr. Surg.* 12(6):871-876; 1977.

Esophageal manometry was used to assess esophageal function after successful repair of esophageal atresia and tracheoesophageal fistula (TEF) in six randomly selected patients and in two patients with recurrent pneumonitis. Esophageal peristalsis was irregular in every patient, and two patients with severe regurgitation and recurrent pneumonitis had marked gastroesophageal reflux. Six patients had normal lower esophageal sphincter (LES) function, with a resting pressure greater than 15 mm of Hg and uniform relaxation with swallowing. The two patients with recurrent pneumonitis, severe regurgitation, and demonstrable gastroesophageal reflux had abnormal LES function, with resting LES pressures of 0 and 11 mm Hg. The patient with the 11-mm Hg gradient had a Nissen fundoplication at the age of 1 yr; his LES did not relax with swallowing, suggesting that this pressure was the result of the surgically created sphincter. Bethanechol (0.075 mg/kg, i.m.) was administered to the two patients with subnormal LES pressure, and the LES function was normal 10 min after drug administration. The LES resting pressure in these two patients was 35 mm Hg and relaxed to gastric pressure with swallowing in both cases. Respiratory reversal occurred proximal to the LES, confirming the absence of hiatal hernia in both children. Esophageal manometry was performed at 1 week and at 9 months after the beginning of bethanechol therapy in one child. At 1 week, the resting LES pressure after p.o. bethanechol (1.25 mg) was 30 mm Hg, and relaxation was normal. At 9 months, the LES pressure before bethanechol was 0 mm Hg; after i.m. bethanechol it was 35 mm Hg, and relaxation was normal. These studies suggest that recurrent pneumonias after repair of TEF with esophageal atresia may be due to an incompetent LES in some children who have esophageal reflux and aspiration. They also demonstrate the usefulness of bethanechol in managing the patient until surgical repair can be carried out.

2062 GASTRIN CONTENT OF COLUMNAR MUCOSA LINING THE LOWER (BARRETT'S) ESOPHAGUS.

(Eng.) Dalton, M. D.; McGuigan, J. E.; Camp, R. C.; Goyal, R. K. (Univ. Texas Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *Am. J. Dig. Dis.* 22(11):970-972; 1977.

Tissue gastrin was determined in 36 biopsy specimens from the esophagus and 35 from the stomach in 12 patients with Barrett's esophagus. Histology of the mucosa from the area adjacent to the biopsy sites was also examined. Esophageal biopsies were obtained from three different sites in each patient. The gastric biopsies were obtained from the antrum, fundus, and the area just distal to the lower border of the lower esophageal sphincter. The columnar mucosa lining the esophagus was of three distinct types: fundic, transitional (cardiac), or specialized. None of these epithelia or the squamous epithelium showed any detectable gastrin. In contrast, antral mucosa had a very high gastrin content (4,870 ± 1,230 pg/mg); smaller amounts of gastrin were detected in duodenal epithelium (710 and 480 pg/ml in two specimens, resp.), whereas fundic mucosa contained very small amounts of gastrin. These results favor a metaplastic origin of Barrett's esophagus.

2063 PALLIATIVE INTUBATION AND RESECTION IN OESOPHAGEAL CARCINOMA.

(Eng.) Angorn, I. B.; Hegarty, M. M.; Baker, L. W. (Dept. Surgery, Univ. Natal, Durban, South Africa). *J. R. Coll. Surg. Edinb.* 22(5):325-330; 1977.

The results of intubation with Celestin tubes or of resection for the palliation of dysphagia in squamous esophageal carcinoma were analyzed in 140 patients. Tumor characteristics that could influence the success of intubation, *viz*, site, length, the presence of total dysphagia, histopathological grading, esophageal axis disturbance, and respiratory tree involvement were evaluated. Intubation was successful in 71% of patients if the tumor was situated between the thoracic inlet and tracheal bifurcation, but in only 47% of patients with lesions more distally situated. The presence of esophageal axis disturbance and esophago-respiratory fistula adversely affected intubation. A randomized trial of intubation *versus* resection for lower esophageal tumors revealed significantly better results for resection. It is recommended that intubation be reserved for upper tumors, and palliative resection be considered for lower tumors.

2064 CRICOPHARYNGEAL MYOTOMY AS A METHOD OF TREATING CRICOPHARYNGEAL DYSPHAGIA SECONDARY TO GASTROESOPHAGEAL REFLUX.

(Eng.) Henderson, R. D.; Marryatt, G. (Women's Coll. Hosp., Toronto, Ontario M5S 1B2, Canada). *J. Thorac. Cardiovasc. Surg.* 74(5):721-725; 1977.

Experience with cricopharyngeal myotomy for the treatment of pharyngoesophageal dysphagia secondary to gastroesophageal reflux during a 5-yr period is presented. Myotomy was used in 2 patients whose only symptom was dysphagia, in 3 patients too debilitated for major surgery, and in 15 patients with persistent pharyngoesophageal dysphagia following hiatal hernia repair. All were studied by barium esophagogram, endoscopy, and manometry. Radiologic aspiration of barium was apparent in 5 of 19 patients. High-speed manometric tracings showed intermittent cricopharyngeal incoordination in the six consecutive patients most recently studied. This finding of incoordination was present in 38 patients with reflux and in all with major cricopharyngeal symptoms. Myotomy was effective in relieving symptoms in patients in whom this was the only reflux symptom and in the patients too debilitated for major surgery. Good symptomatic improvement was obtained in nine patients with persistent dysphagia following hernia repair, but in three, relief was partial, with persistent symptoms being secondary to distal esophageal obstruction. Investigation is necessary to exclude other causes of dysphagia. However, with careful selection, myotomy has proved to be an effective method of treatment.

2065 SYMPTOMATIC REFLUX ESOPHAGITIS: A DOUBLE-BLIND CONTROLLED COMPARISON OF ANTACIDS AND ALGINATE.

(Eng.) Graham, D. Y.; Lanza, F.; Dorsch, E. R. (Baylor Coll. Medicine, 1200 Moursund Ave., Houston, TX 77030). *Curr. Ther. Res.* 22(5): 653-658; 1977.

A 4-week double-blind study of the effectiveness of antacid tablets and of alginate-containing tablets was undertaken in 41 patients with esophagitis. The patients received either (a) a preparation containing stoichiometric amounts of alginic acid, sodium bicarbonate, and aluminum hydroxide dried gel (80 mg) and magnesium trisilicate (20 mg) or (b) an antacid containing co-dried aluminum hydroxide and magnesium carbonate (203.1 mg), manitol (101.53 mg), dextrose (1,159.74 mg), sucrose (101.53 mg), methyl cellulose (10.12 mg), calcium stearate (16.0 mg), and flavoring. Both treatment regimens produced significant improvement in severity and frequency of heartburn and in reversal of endoscopic findings of mucosal friability or erosions. Approximately 75% of both groups achieved complete healing of endoscopic manifestations of esophagitis. Antacid yielded better symptomatic relief, although the differences between the groups were not statistically significant. As the effectiveness of the two agents is probably dependent upon different mechanisms, it is possible that a combination of these agents would produce a synergistic effect and provide an ideal therapeutic regimen.

2066 STUDIES OF ESOPHAGEAL EPITHELIAL CELL PROLIFERATION IN PATIENTS WITH REFLUX ESOPHAGITIS.

(Eng.) Livstone, E. M.; Sheahan, D. G.; Behar, J. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Gastroenterology* 73(6): 1315-1319; 1977.

The *in vitro* proliferative activity of the basal zone of the esophagus was studied in suction biopsy specimens from 7 normal subjects, 19 patients with medically treated esophagitis, and 8 patients who had previously undergone anterior fundoplication. In the 10 patients with severe esophagitis, the basal zone showed a significantly elevated [^{3}H]thymidine labeling index (14.4 ± 2.2%) in contrast to that of mild esophagitis patients (6.4 ± 0.6%) and that of normal subjects (6.1 ± 0.7%, $p<0.05$). When esophagitis was associated with mucosal lesions at endoscopy, the labeling index was higher than that seen in esophagitis patients without endoscopic abnormalities ($p<0.05$). Significantly increased thymidine labeling was found only in patients with the most severe changes of papillary length or basal layer thickening. It is concluded that there is an increased basal zone uptake of [^{3}H]thymidine in severe esophagitis, which suggests increased cell turnover as the mechanism for basal zone hyperplasia. Present techniques for measuring mucosal uptake of [^{3}H]thymidine, however, do not permit the distinction of mild degrees of esophagitis from normal epithelium.

2067 COMPLICATIONS AND FAILINGS OF THE COMBINED COLLIS-BELSEY OPERATION. (Eng.) Orringer, M. B.; Sloan, H. (C7175 Univ. Hosp., Ann Arbor, MI 48109). *J. Thorac. Cardiovasc. Surg.* 74(5):726-735; 1977.

Complications and early follow-up data are presented on 83 patients who underwent the Collis-Belsey operation (gastroplasty combined with hiatal hernia repair). These patients were at risk for the recurrence of reflux after standard hiatal hernia repairs. There were two postoperative deaths. Complications related to multiple operations on the lower esophagus included injury to the spleen (3 patients), gastrocutaneous fistula (2 patients), and localized ischemic necrosis of the esophagus (2 patients). There were two esophageal perforations. In 4 of 15 patients, the combination of esophagomyotomy and the Collis-Belsey operation produced functional esophageal obstruction. Three patients experienced late major lower esophageal bleeding from ulceration of mucosa adjacent to the gastroplasty tube; two of these patients have no demonstrable gastroesophageal reflux. In addition to postoperative interviews and barium swallows, 77 patients were evaluated with esophageal manometry and acid reflux testing. After an average follow-up of 12 months, 19% have symptomatic reflux, but 30% have moderate-to-severe reflux with pH reflux testing. The recent popularity of the combined Collis-Belsey operation to reduce the incidence of recurrent gastroesophageal reflux should be tempered by continued, cautious, objective assessment of its long-term results.

2068 INTRAOPERATIVE AND POSTOPERATIVE ESOPHAGEAL MANOMETRIC FINDINGS WITH COLLIS GASTROPLASTY AND BELSEY HIATAL HERNIA REPAIR FOR GASTROESOPHAGEAL REFLUX. (Eng.) Cooper, J. D.; Hill, S. S.; Nelems, J. M.; Pearson, F. G. (Toronto General Hosp., Toronto, Ontario M5G 1L7, Canada). *J. Thorac. Cardiovasc. Surg.* 74(5):744-751; 1977.

The effect of gastroplasty and Belsey repair on intraluminal pressure changes in the gastroplasty and lower esophagus was studied in 11 patients. Manometry was performed preoperatively, intraoperatively, and postoperatively. In each case, the gastroplasty segment of the esophagus was found to function as a high pressure zone (HPZ). The pressure in this zone further increased following fundoplication. It could be diminished by the i.v. administration of hyoscine-*N*-butylbromide and augmented with i.v. pentagastrin. The original lower esophageal sphincter in most instances was included in the upper segment of the gastroplasty tube, but the entire length of the gastroplasty tube functioned as an HPZ, and pressures in the tube were considerably higher than those originally present in the lower esophageal sphincter. These studies provide a physiological basis for the effectiveness of gastroplasty and fundoplication.

2069 ABNORMALITIES OF GASTRIC EMPTYING AND PYLORIC REFLUX IN UNCOMPLICATED HIATUS HERNIA. (Eng.) Donovan, I. A.; Harding, L. K.; Keighley, M. R. B.; Griffin, D. W.; Collis, J. L. (General Hosp., Birmingham, England). *Br. J. Surg.* 64(12):847-848; 1977.

The rate of gastric emptying of solid and liquid meals was studied in 10 patients with hiatal hernia, 22 patients with duodenal ulcer, and 8 controls, using an external scanning technique. Pyloric reflux was studied by a radiological technique. There was a significant delay in the emptying of both solid and liquid meals in the patients with hiatal hernia compared with both the duodenal ulcer patients (solid meals $p<0.01$, liquid meals $p<0.025$) and with normal controls (solid meals $p<0.05$, liquid meals $p<0.001$). Duodenogastric reflux was observed in 35% of hiatal hernia patients compared with 24% of duodenal ulcer patients and 0% of the controls. The findings of delayed gastric emptying and an increased incidence of duodenogastric reflux suggest a possible cause for the symptoms.

2070 ESOPHAGEAL HISTOLOGY IN GASTROESOPHAGEAL REFLUX: MORPHOMETRIC FINDINGS IN SUCTION BIOPSIES. (Eng.) Seefeld, U.; Krejs, G. J.; Siebenmann, R. E.; Blum, A. L. (Stadtspital Triemli, 8063 Zurich, Switzerland). *Am. J. Dig. Dis.* 22(11):956-964; 1977.

To study the histological appearance of esophageal damage produced by reflux, esophageal suction biopsies were taken in 24 subjects with proven gastroesophageal reflux, 12 subjects with suspected reflux, and 20 healthy controls. Sixty-two percent of the patients with proven reflux, 33% of the patients with suspected reflux, and 10% of the controls had neutrophilic and/or eosinophilic granulocytes in the lamina propria. Lymphocytes, plasma cells, and basophilic granulocytes were shown to be constituents of the normal esophageal mucosa. All epithelial dimensions showed marked individual variations in reflux patients and controls. The relative length of stromal papillae, as expressed in percent of total epithelial thickness, showed a linear correlation with relative basal cell thickness and an indirect linear correlation with epithelial thickness. Elongation of stromal papillae in proven reflux could only be demonstrated by arbitrary retrospective stratification of the data. Hyperplasia of the basal zone and thinning of the epithelium were not observed in the reflux patients. It is concluded that granulocytic infiltrates and not epithelial alterations are the most prominent histological finding in gastroesophageal reflux.

2071 THE EFFECT OF METOCLOPRAMIDE ON GASTRO-OESOPHAGEAL REFLUX. (Eng.) Pflucke, F.; Arendt, R. (Clinic Internal Medicine, Wilhelm Pieck Univ., Ernst Hendemann Strasse, DDR-25 Rostock, E. Germany). *Tijdschr. Gastroenterol.* 20(3):155-162; 1977.

Recordings of esophageal pH values in 17 patients with gastroesophageal reflux revealed that the i.v. administration of 0.15 mg/kg of metoclopramide significantly ($p<0.01$) reduced reflux duration and frequency. Reflux phenomena disappeared completely in 8 of the 17 patients, and the reflux frequency was reduced in 16 patients. The effect was seen clearly after 10-20 min and was still evident after 2 hr. The mean total reflux duration dropped from 31.9%/hr before metoclopramide treatment to 14.6%/hr after drug treatment. The mean reflux frequencies before and after drug treatment were 6.3/hr and 2.3/hr, resp. The effect of metoclopramide on reflux duration and frequency is probably dependent on the presence of a lower esophageal sphincter. Thus, if the sphincter region has been surgically removed, no considerable reflux-reducing effect can be expected.

2072 POSTPRANDIAL GASTRO-OESOPHAGEAL REFLUX IN HEALTHY PEOPLE. (Eng.) Kaye, M. D. (Univ. Vermont Coll. Medicine, Burlington, VT). *Gut* 18(9):709-712; 1977.

Studies were carried out to determine whether or not the normal lower esophageal sphincter remains continuously competent under physiological conditions, in an effort to provide a more solid basis for the definition of incompetence of the lower esophageal sphincter and to devise a test applicable to the investigation of physiological and pharmacological influences upon its competence. Distal esophageal pH was monitored for 3 hr after a standard meal in 10 young healthy subjects without symptoms of gastro-esophageal reflux. Episodes of reflux occurred in nine subjects, and in five, the esophageal pH was less than 5 for between 11% and 75% of the first postprandial hour. Intermittent incompetence of the lower esophageal sphincter after food must, therefore, be regarded as a normal phenomenon. The method described would be suitable for the evaluation of agents believed to weaken or to strengthen the lower esophageal sphincter.

2073 DIFFUSE SPASM OF THE ESOPHAGUS: CLINICAL, MANOMETRIC, AND SURGICAL CONSIDERATIONS. (Eng.) Leonardi, H. K.; Shea, J. A.; Crozier, R. E.; Ellis, F. H., Jr. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *J. Thorac. Cardiovasc. Surg.* 74(5):736-743; 1977.

Pre- and postoperative clinical, manometric, and roentgenographic findings are presented for 11 patients who underwent extended esophagomyotomy for diffuse spasm of the esophagus (DSE). Preoperative manometry performed in all patients disclosed a mean deglutitive pressure of 70 mm Hg in the diseased areas and indicated the required length of myotomy. The lower esophageal sphincter (LES) was within normal limits in most instances, with a mean amplitude of 20 mm Hg, and its exclusion from the myotomy eliminated the need for additional antireflux procedures. Postoperative manometry in 10 patients disclosed a 70% reduction in deglutitive pressures in the myotomized segments, and the mean LES amplitude of 13 mm Hg remained within the normal range (10-20 mm Hg). Ten of the 11 patients were clinically improved, and postoperative reflux developed in only 1 patient. These results support the continued use of extended esophagomyotomy in selected patients with DSE and suggest that exclusion of the LES from the myotomy affords satisfactory antireflux protection without ancillary sphincter-enhancing maneuvers.

2074 FURTHER EVALUATION OF THE SUGIURA PROCEDURE IN THE TREATMENT OF ESOPHAGEAL VARICES. (Eng.) Sugiura, M.; Futagawa, S. (Second Dept. Surgery, Univ. Tokyo, Hongo 7-3-1, Bunkyoku, Tokyo, Japan). *Arch. Surg.* 112(11):1317-1321; 1977.

The results of esophageal transection with paraesophagogastric devascularization (the Sugiura procedure) for bleeding esophageal varices were evaluated in 276 patients who underwent the procedure between 1967 and the present. Sixty procedures were prophylactic, 164 were elective, and 52 were emergency procedures. The age distribution was from 9 months to 74 yr. The origin was cirrhosis in 191 patients, fibrosis in 59, extrahepatic portal vein occlusion in 18, hepatoma in 5, schistosomiasis in 1, Budd-Chiari syndrome in 1, and carcinoma of the pancreas in 1 patient. The mortality within 1 month of surgery was 5.0% in prophylactic cases, 1.8% in elective cases, and 11.5% in emergency cases (mean, 4.3%). The 7-yr survival rate was 83%. There was an obvious positive correlation between survival rate and stage of the disease. Ninety-five percent of class A (Child's classification) and 87% of class B are alive, but only 59% of class C patients are alive at the present. Six patients had recurrences of varices for a recurrence rate of 2.3%, of whom four had esophageal bleeding. It may be that recurrence of varices occurred due to incomplete devascularization of the esophagus at the diaphragm because of the necessity of two-stage operations in poor-risk patients. All survivors are free from encephalopathy. This study reconfirms that the Sugiura method is safe and effective in controlling esophageal variceal bleeding without compromising epatic function.

2075 HISTOLOGY OF ESOPHAGEAL SMOOTH MUSCLE AND AUERBACH'S PLEXUS IN ELDERLY PERSONS Abstract]. (Eng.) Eckardt, V. F.; LeCompte, P. M. Lemuel Shattuck Hosp., Boston, MA). *Gastroenterology* 2(5, Part 2):1055; 1977.

076 A COMBINED pH AND X-RAY STUDY OF A LIQUID ALGINATE/ANTACID FORMULATION USING A OVEL X-RAY CONTRAST MEDIUM. (Eng.) Goodall, J. S.; rwin, J. M.; Imrie, M. J. (Medical Dept., Reckitt nd Colman, Pharmaceutical Div., Hull, England). *cta Ther. (Basel)* 3(2):141-154; 1977.

077 ESOPHAGEAL DILATATION UNDER FIBERENDOSCOPIC CONTROL [Abstract]. (Eng.) Schiessel, R.; instl, K. (First Surgical Univ. Clinic, Vienna, ustria). *Endoscopy* 9(2):113; 1977.

078 THE EFFECT OF THE SURGICAL APPROACH ON RESPIRATORY FUNCTION AFTER OESOPHAGEAL ESECTION. (Eng.) Black, J.; Kalloor, G. J.; ollis, J. L. (Queen Elizabeth Hosp., Edgbaston, irmingham, England). *Br. J. Surg.* 64(9):624-627; 977.

079 NEW TRENDS IN ESOPHAGEAL REPLACEMENT FOR BENIGN DISEASE. (Eng.) Orringer, M. B.; irsh, M. M.; Sloan, H. (C-7175 Univ. Hosp., Ann rbor, MI 48109). *Ann. Thorac. Surg.* 23(5):409-16; 1977.

080 RECONSTRUCTION OF THE ESOPHAGUS BY POSTERIOR INVAGINATION ESOPHAGOGASTROSTOMY. Eng.) Okada, N.; Tagami, Y.; Morishita, H.; ishimura, O.; Takimoto, M.; Kodama, K. (Wakayama edical Coll., 7 Bancho 1, Wakayama City 640, Japan). *orld J. Surg.* 1(3):361-370; 1977.

081 THE ESOPHAGEAL ANASTOMOTIC LEAK. (Eng.) Hermreck, A. S.; Crawford, D. G. (Univ. ansas Medical Center, 39th and Rainbow Blvd., Kansas ity, KS 66103). *Am. J. Surg.* 132(6):794-798; 1976.

082 ABSENT GASTRIC AIR BUBBLE: A RADIOLOGIC SIGN OF ACHALASIA [Abstract]. (Eng.) rlando, R. C.; Call, D. L.; Bream, C. A. (Univ. orth Carolina Sch. Medicine, Chapel Hill, NC). *astroenterology* 72(5, Part 2):1110; 1977.

083 ESOPHAGEAL EMPTYING IN ACHALASIA, QUANTITATED BY A RADIOISOTOPIC TECHNIQUE Abstract]. (Eng.) Gross, R.; Johnson, L. F.; aminski, R. J. (Walter Reed Army Medical Center, ashington, DC). *Gastroenterology* 72(5, Part 2): 159; 1977.

2084 SELECTIVE SURGICAL MANAGEMENT BASED UPON CLINICAL STATUS IN INFANTS WITH ESOPHAGEAL ATRESIA. (Eng.) Randolph, J. G.; Altman, R. P.; Anderson, K. D. (Dept. Surgery, George Washington Univ., Washington, DC 20006). *Thor. Cardiovasc. Surg.* 74(3):335-342; 1977.

2085 EARLY RECOGNITION AND AGGRESSIVE TREATMENT OF GASTROESOPHAGEAL REFLUX FOLLOWING REPAIR OF ESOPHAGEAL ATRESIA. (Eng.) Ashcraft, K. W.; Goodwin, C.; Amoury, R. A.; Holder, T. M. (Children's Mercy Hosp., 24th St. and Gillham Rd., Kansas City, MO 64108). *J. Pediatr. Surg.* 12(3): 317-321; 1977.

2086 BARRETT'S EPITHELIUM REGRESSES AFTER SUCCESSFUL ANTI-REFLUX SURGERY [Abstract]. (Eng.) Brand, D. L.; Pope, C. E., II. (Veterans Admin. Hosp., Seattle, WA). *Gastroenterology* 72(5, Part 2):1033; 1977.

2087 CELL PROLIFERATION IN 3 TYPES OF BARRETT'S EPITHELIUM [Abstract]. (Eng.) Pellish, L. J.; Hermos, J. A.; Eastwood, G. L. (West Roxbury Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2): 1112; 1977.

2088 CELL PROLIFERATION IN ESOPHAGEAL COLUMNAR EPITHELIUM (BARRETT'S ESOPHAGUS) [Abstract]. (Eng.) Herbst, J.; Berenson, M.; McCloskey, D.; Freston, J. (Univ. Utah Coll. Medicine, Salt Lake City, UT). *Gastroenterology* 72(5, Part 2):1068; 1977.

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case of gastric phytobezoar formation that was econdary to diabetic autonomic neuropathy is reorted. Greatly impaired gastric emptying was ocumented in this case by the administration of radiolabeled meal. The patient's half-time of astric emptying was 282 min. The i.v. and p.o. dministration of metoclopramide hydrochloride 10 mg, 4 x/day, p.o.) completely corrected the atient's gastric motility disturbance. Diabetic utonomic neuropathy may result in delayed gastric mptying and gastric retention.

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n 46 patients with gastric cancer who were to ndergo gastrectomy, the fasting serum gastrin oncentration in the peripheral vein was estimated y radioimmunoassay. Blood samples were also ollected from the gastric veins and artery during he operations. These gastrin values were compared ith morphological findings in the resected stomach. o significant difference in serum gastrin conentration was found between the patients with astric cancer and 11 normal subjects. In the atients with mucosal atrophy in the oxyntic land area but with no atrophy in the pyloric land area, however, a significant increase in erum gastrin concentration ($p<0.05$) was observed. n cases in which fundal atrophy was accompanied y atrophy in the pyloric gland area, this inrease was not observed. The gastrin content of he cancerous tissue was negligible. These reults indicate that the increase in serum gastrin oncentration in some patients with gastric cancer ight be due to the associated atrophy of the xyntic glands.

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STOMACH

Peptic Ulcers

2163 GASTRIC CYCLIC NUCLEOTIDE CONCENTRATION IN HEALTH AND DISEASE. RESPONSE TO SECRETAGOGUES AND ROLE OF CIRCULATING GASTRIN AND INTRAGASTRIC ACID SECRETION. (Eng.) Levine, R. A.; Schwartzel, E. H., Jr.; Bachman, S.; Talev, J. N. (Upstate Medical Center, 750 East Adams St., Syracuse, NY 13210). *Gastroenterology* 73(4, Part 1): 737-745; 1977.

Cyclic AMP and cyclic guanosine monophosphate (GMP) concentrations were measured in suction biopsy specimens of gastric fundic and antral mucosa and in gastric juice in response to maximum stimulation by histamine (0.015 mg/kg/hr), betazole (1.5 mg/kg), and pentagastrin (6 μg/kg) in 14 normogastrinemic healthy subjects, in 46 patients with dyspepsia or peptic ulcer (PU) disease and normal serum gastrin levels, and in 14 patients with hypergastrinemia (8 with pernicious anemia [PA], 3 with Zollinger-Ellison [ZE] syndrome, and 3 with gastric carcinoma). No regional differences were noted in unstimulated gastric antral or fundic cyclic nucleotide content in normal subjects or patients. During secretagogue stimulation, no significant changes in cyclic nucleotide concentrations were observed in antral or fundic mucosa of healthy subjects or patients. During basal hourly secretion, cyclic nucleotide concentration and output in gastric juice were relatively constant, suggesting a steady state of secretion. After secretagogue stimulation, the concentrations of cyclic AMP and cyclic GMP were reduced by at least 50% and correlated with the increased parietal volume output, suggesting a dilutional effect. There was no significant change in gastric juice cyclic nucleotide output except in PU subjects after betazole stimulation, in whom cyclic AMP production increased almost twofold. This change in gastric juice cyclic AMP concentration was proportional to a greater parietal volume flow and did not reflect intracellular mucosal events. Similarly, a decreased concentration of cyclic AMP in the basal and stimulated gastric juice of ZE patients and a reduced cyclic AMP output in PA patients was also proportional to volume flow. The presence of cyclic AMP in unstimulated gastric juice in PA suggests, in part, a nonparietal origin for cyclic AMP, probably derived from interstitial fluid secretion or transmucosal exudation from plasma. It is concluded that intra- or extracellular gastric cyclic AMP or cyclic GMP concentrations are not modulated by secretagogue stimulation, circulating high gastrin levels, alteration in intraluminal pH, or increasing age. These studies fail to implicate cyclic nucleotides as intracellular mediators of stimulated gastric acid secretion in healthy subjects, PU disease PA, ZE syndrome or gastric carcinoma.

2164 GASTRIC SECRETION AND EMPTYING AFTER ORDINARY MEALS IN DUODENAL ULCER. (Eng.) Malagelada, J. R.; Longstreth, G. F.; Deering, T. B.; Summerskill, W. H. J.; Go, V. L. W. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 73(5):989-994; 1977.

The gastric response to an ordinary solid-liquid meal was studied in 12 patients with active duodenal ulcer and 8 healthy volunteers, using gastric and duodenal markers to quantify acid, pepsin, and volume outputs in response to the meal, without manipulating intragastric pH. Intragastric volume, rate of gastric emptying, delivery of acid into the duodenum, and serum gastrin response were also measured simultaneously. On a separate day, peak acid output in response to betazole (1.5 mg/kg, s.c.) was determined. There was an inappropriately prolonged gastric secretory response to meals in duodenal ulcer disease, without a concomitant increase in peak postprandial secretory rates or an increase in serum immunoreactive gastrin levels. The stomach in duodenal ulcer disease did not "retain" the additional acid secreted in the later postprandial period, and abnormally high rates of acid delivery into the duodenum occurred. These data are consistent with a dual defect in the duodenal mechanisms regulating both acid secretion and acid delivery into the duodenum.

2165 ACID AND ENDOCRINE RESPONSES TO MEALS VARYING IN pH IN NORMAL AND DUODENAL ULCER SUBJECTS. (Eng.) Thompson, J. C.; Swierczek, J. S. (Univ. Texas Medical Branch, Galveston, TX 77550). *Ann. Surg.* 186(4):541-548; 1977.

Gastric acid, gastrin, gastric inhibitory peptide (GIP), and secretin responses to meals (varying in pH) were compared in 12 normal subjects and 9 duodenal ulcer patients. Acid secretion was measured by an intragastric titration method that allows actual measurement of acid response to food within the stomach (10% amino acid meal, adjusted to various pH levels, 7-1.5). Blood samples were collected at each pH level for radioimmunoassay of gastrin, secretin, and GIP. Gastric acid and gastrin responses to the amino acid meal (AAM) were significantly greater in duodenal ulcer patients than in normal subjects. In duodenal ulcer patients, acid response to AAM at pH 7 or 5.5 reached 82% of Histolog maximum. Decreasing the pH of the meal resulted in a stepwise reduction in both acid secretion and gastrin in normal subjects and duodenal ulcer patients. At pH 1.5, acid inhibition was complete, but gastrin inhibition was partial. Secretin concentration increased significantly at pH 1.5; there was no difference in secretin release between the groups. Plasma GIP was highest at pH 7 in all individuals. Use of a marker substance showed 80% recovery of AAM at pH 7-4; below pH 4, recovery rose to about 90%. It is concluded that gastric acid and gastrin release are pH-dependent in normal subjects and duodenal ulcer patients. Inhibition of gastric secretion by acidified meals is associated with a pH-dependent suppression of gastrin and GIP levels and an elevation of plasma secretin. This study confirms increased acid and gastrin responses in duodenal ulcer patients but shows no evidence of defective feedback inhibition of gastric secretion and gastrin release.

2166 THE EFFECT OF GASTRIC DISTENSION ON THE SECRETION OF ACID AND PEPSIN BY PATIENTS WITH DUODENAL ULCER. (Eng.) Saunders, J. H. B.; Wormsley, K. G. (Ninewells Hosp., Dundee DD2 1UB, Scotland). *Acta Hepatogastroenterol.* 24(4):271-277; 1977.

The effect of gastric distention on the secretion of acid and pepsin was studied in 24 patients with chronic duodenal ulcers to determine the presence of "neural tone." Basal secretion was collected for 1 hr from 14 patients who were successively insufflated with 50, 100, and 200 ml of air by a rubber balloon (each distention was maintained for 30 min). Gastric contents were collected every 15 min and the acid and pepsin levels were assayed. Nine of these patients were subjected to a second test and were insufflated with 200 ml of air for 1 hr after collection of a 1-hr basal secretion. Seven other patients received only the second test. Acid and pepsin secretion after graded distention displayed similar patterns. The mean acid output of the 14 subjects was 2.4 mmol/30 min, and was 3.4 (42% greater than basal values), 2.6, and 5.5 mmol/30 min (129%) in response to 50, 100, and 200 ml of air, resp. Pepsin output was increased by 31 and 79% in response to 50 and 200 ml of air, resp. Acid and pepsin secretion in response to prolonged distention with 200 ml of air was similar to that observed with graded distention; there was a 59% increase in acid concentration, a 173% increase in acid output, and a 151% increase in pepsin output. In a third test schedule, pentagastrin was infused 1 hr before distention with 200 ml of air. Low doses (0.02 μg/kg body weight/hr, 12 subjects) produced an acid response 83% greater, and a pepsin response 43% greater, than basal values. A high dose of pentagastrin (2 μg/kg/hr) had no significant effect on acid or pepsin output. Thus, distention stimulated gastric secretion in a manner similar to, but weaker than, pentagastrin. The results suggest that gastric distention does not produce a "neural" stimulus for the gastric secretion of acid or pepsin in man.

2167 IS THERE AN OXYNTOPYLORIC REFLEX FOR RELEASE OF GASTRIN IN MAN? (Eng.) Grotzinger, U.; Rehfeld, J. F.; Olbe, L. (Kantonsspital, CH-4004 Basel, Switzerland). *Gastroenterology* 73(4, Part 1):753-757; 1977.

In order to determine whether gastrin released by an oxyntopyloric reflex contributes to acid secretion, plasma gastrin concentrations and gastric acid output were measured during graded balloon distention of the gastric fundus and body in 20 patients with duodenal ulcer. Acid output rose stepwise with increasing distention volumes, but plasma gastrin remained unchanged. During intragastric neutralization in five subjects, fundic distention did not elicit a significant rise in plasma gastrin, whereas the acid response was similar to that observed in the control study when the gastric contents were acid. In eight patients, proximal gastric vagotomy profoundly suppressed the acid response to fundic distention. Basal plasma gastrin concentrations were elevated after vagotomy, but were unchanged during graded fundic distention. The results suggest that neural reflex activation of the oxyntic glands is the main mechanism by which fundic distention stimulates acid secretion in man. The failure of fundic distention to release gastrin does not completely rule out the existence of an oxyntopyloric distention reflex for gastrin release in man. Fundic distention in man seems to both stimulate acid secretion and induce an inhibitory mechanism acting on acid secretion. The authors suggest that this inhibitory mechanism may also mask the effect of an oxyntopyloric reflex for gastrin release. The present study and earlier work suggest that, in man, distention of the stomach is a poor stimulus for release of gastrin, regardless of whether the pyloric or the oxyntic gland area, or both, are distended.

2168 THE ACTION OF ANTACIDS ON SERUM GASTRIN CONCENTRATIONS IN MAN. (Eng.) Feurle, G. E. (Medizinische Universitats-Poliklinik, Hospitalstrasse 3, D-6900 Heidelberg, W. Germany). *Klin. Wochenschr.* 55(21):1039-1042; 1977.

To investigate the effect of antacids on serum gastrin concentration, the effects of two doses of NaCl and $NaHCO_3$, as well as of $AlCl_3$ (all three substances, 30 ml, 8 g/100 ml) and $Al(OH)_3$ (30 ml, 5.4 g/100 ml), resp., on serum gastrin concentrations and intragastric pH were compared in 27 duodenal ulcer patients. In addition, the effect of one dose of an AlPO containing commercial antacid on serum gastrin concentration and intragastric pH was studied in duodenal ulcer patients and in seven controls. Care was taken to induce swallowing at the times that the substances were given through an orogastric tube. Antacids elicited significantly greater gastrin responses than their nonbuffering chloride compounds ($p<0.05$), and the rise in gastrin level after a single dose of antacid was small but significant ($p<0.05$) in duodenal ulcer patients and insignificant in nonulcer controls. Several factors such as rising intragastric pH, individual responsiveness, duodenal ulcer state, vagal influences, and the participating ions, and their amount contribute to the rise in gastrin levels after antacids.

2169 CARBENOXOLONE SODIUM CAPSULES IN THE TREATMENT OF DUODENAL ULCER: AN ENDOSCOPIC CONTROLLED TRIAL. (Eng.) Sahel, J.; Sarles, H.; Boisson, J.; Bonnet-Eymard, J.; Cornet, A.; Delmont, J.; *et al.* (U-31 INSERM, Marseille, France). *Gut* 18(9):717-720; 1977.

The results of carbenoxolone treatment for duodenal ulcer were assessed in a multicenter controlled trial of 86 patients with duodenal ulcer who were treated with carbenoxolone capsules (50 mg, q.i.d. for 6 weeks) or a placebo. Sixty-nine patients underwent endoscopy at the beginning and end of the treatment. Symptomatic responses and endoscopic improvement were significantly greater in those receiving the active preparation than in those receiving the control capsules; complete, endoscopically assessed, healing was achieved in 65% and 20%, resp., of individuals who underwent endoscopy, after 6 weeks of treatment. Side-effects of salt and water retention or hypokalemia were noted in over one-fourth of those receiving the carbenoxolone capsules, but none of the adverse effects was severe enough to necessitate withdrawal of treatment. The results show that treatment with carbenoxolone sodium capsules accelerates the healing of duodenal ulcers and that this healing is paralleled by the remission of symptoms.

2170 CIMETIDINE FOR DUODENAL ULCERATION IN PATIENTS UNDERGOING HAEMODIALYSIS. (Eng.) Doherty, C. C.; O'Connor, F. A.; Buchanan, K. D.; McGeown, M. G. (Belfast City Hosp., Belfast BT9 7AB, Northern Ireland). *Br. Med. J.* 2(6101):1506-1508; 1977.

The effect of cimetidine was assessed in the treatment of nine patients with acid hypersecretion and endoscopically diagnosed duodenal ulceration who were undergoing hemodialysis. The patients obtained good pain relief and suffered no serious side-effects. Both basal and stimulated acid output fell considerably, and the plasma gastrin response to food increased during treatment. Two patients with recurrent vomiting during hemodialysis had a striking response to cimetidine, which suggested that such vomiting may be acid-mediated in some patients. These preliminary results suggest that cimetidine may prove to be an advance in the management of peptic ulcer in uremic patients.

2171 DOUBLE-BLIND CLINICAL TRIAL ON GASTRODUODENAL ULCER HEALING WITH PROSTAGLANDIN E_2 ANALOGUES. (Eng.) Gibinski, K.; Rybicka, J.; Mikos, E.; Nowak, A. (Silesian Sch. Medicine, Katowice, Poland). *Gut* 18(8):636-639; 1977.

Seventy-seven patients with gastroduodenal ulcer were treated p.o. with two methyl-prostaglandin E_2 analogues (m-PGE_2) in a double-blind clinical trial. Each of three groups was given 15 S-15 methyl PGE_2 methyl ester (1.5 μg/kg), 15 R-15 methyl PGE_2 methyl ester (2 μg/kg), and placebo, resp. Both forms of m-PGE_2 analogues appeared to reduce gastric acid secretion ($p<0.01$ for 15 R-15 methyl PGE methyl ester; $p<0.001$ for 15 S-15 methyl PGE_2 methyl ester), to shorten ulcer healing ($p<0.001$ for 15 S-15 methyl PGE_2 methyl ester only), and also to produce some side-effects (diarrhea, vomiting, and pain), form "S" being the more potent. Prompt healing of the ulcer with these agents did not prevent the recurrence of the disease. As the serum gastrin response to a meal after m-PGE_2 administration was not reduced, this agent seems directly to affect oxynthic cells.

2172 FAT INDUCED JEJUNAL INHIBITION OF GASTRIC ACID SECRETION IN DUODENAL ULCER PATIENTS BEFORE AND AFTER TRUNCAL VAGOTOMY. (Eng.) Christiansen, J. (Glostrup Hosp., DK-2600 Glostrup, Copenhagen, Denmark). *Ann. Surg.* 186(5):573-576; 1977.

To investigate whether fat-induced jejunal inhibition of acid secretion in man is dependent on intact vagal innervation, the effect of intrajejunal infusion of a fat solution on pentagastrin-stimulated (0.5 μg/kg/hr) gastric acid secretion was studied in five duodenal ulcer patients before and 3 to 5 months after truncal vagotomy. Preoperatively, the mean acid output was reduced from 41 ± 5.2 mEq H^+/hr to 15.4 ± 1.3 mEq H^+/hr ($p<0.005$), and postoperatively from 17.4 ± 2.6 mEq H^+/hr to 12.7 ± 2.4 mEq/hr ($p<0.01$). These results demonstrate that fat-induced jejunal inhibition of gastric acid secretion is humorally mediated either in whole or in part. Furthermore, fat-induced jejunal inhibition of acid secretion in duodenal ulcer patients seems to be of the same magnitude as previously found in healthy subjects.

2173 CAUSES OF DEATH IN DUODENAL AND GASTRIC ULCER. (Eng.) Bonnevie, O. (Hvidovre Hosp., Univ. Copenhagen, 2650 Hvidovre, Denmark). *Gastroenterology* 73(5):1000-1004; 1977.

An analysis was made of 235 deaths that occurred among 1,905 patients with peptic ulcer to examine whether these patients died more frequently than expected of specific diseases. These patients constituted a random sample of the occurrence of ulcer disease in an area of Denmark comprising half a million inhabitants. The disease itself, according to the death certificate, was considered the primary cause of death in 10% of the cases; half of these had been operated on immediately before death. The other patients died more frequently than expected from the following causes: chronic bronchitis, pulmonary emphysema, lung cancer, liver cirrhosis, and pancreatic cancer. Although the comorbidity with chronic bronchitis and emphysema was especially pronounced in patients with gastric ulcer, the association with liver cirrhosis and pancreatic cancer occurred only in patients with duodenal ulcer. In women, the mortality rate attributable to cardiac and vascular diseases was lower than expected. No excess coincidence of suicide was found. Berkson's fallacy, a false association between diseases, is considered to be of much less importance as a possible explanation of the comorbidity found in the present study than in the majority of publications concerned with this question.

2174 THE BIOAVAILABILITY OF CIMETIDINE IN PATIENTS WITH PEPTIC ULCER DISEASE BEFORE AND DURING CIMETIDINE TREATMENT [Abstract]. (Eng.) Bodemar, G.; Norlander, B.; Fransson, L.; Walan, A. (Linkoping Univ. Hosp., Linkoping, Sweden). *Gastroenterology* 12(Suppl. 45):10; 1977.

2175 CONSERVATIVE TREATMENT OF PERFORATED PEPTIC ULCER. 20 YEARS EXPERIENCE [Abstract]. (Eng.) Beisland, H. O. (Lillehammer Hosp., Lillehammer, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):8; 1977.

2176 CIMETIDINE IN ONE YEAR TREATMENT OF RECURRENT PEPTIC ULCER DISEASE [Abstract]. (Eng.) Bodemar, G.; Walan, A. (Linkoping Univ. Hosp., Linkoping, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):11; 1977.

2177 THE INFLUENCE OF A MEAL AND ANTACIDS ON CIMETIDINE ABSORPTION IN PATIENTS WITH PEPTIC ULCER DISEASE [Abstract]. (Eng.) Bodemar, G.; Norlander, B.; Fransson, L.; Walan, A. (Linkoping Univ. Hosp., Linkoping, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):12; 1977.

2178 SURVIVAL IN PEPTIC ULCER [Abstract]. (Eng.) Bonnevie, O. (Hvidovre Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):14; 1977.

2179 PERFORATED DUODENAL ULCER TREATED BY SIMPLE SUTURE, ONCE AGAIN [Abstract]. (Eng.) Baekgard, N.; Lawaetz, O.; Poulsen, P. E. (Glostrup Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):15; 1977.

2180 JEJUNAL INHIBITORY MECHANISMS OF GASTRIC ACID SECRETION IN NORMAL SUBJECTS AND DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Christiansen, J. (Glostrup Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45): 16; 1977.

2181 INHIBITION OF BASAL AND PENTAGASTRIN STIMULATED GASTRIC ACID SECRETION AFTER LONG TERM TREATMENT WITH BENZILONIUM BROMIDE [Abstract]. (Eng.) Jaska, F.; Steen, S. (Koping Hosp., Koping, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):39; 1977.

2182 THE AARHUS COUNTY VAGOTOMY TRIAL. INTERIM REPORT [Abstract]. (Eng.) Amdrup, E.; Andersen, D.; Hostrup, H. (Kommunehospitalet, Aarhus, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):4; 1977.

2183 THE DIFFERENT COMPONENTS OF GASTRIC EMPTYING AFTER GASTRIC SURGERY. (Eng.) Donovan, I. A. (General Hosp., Birmingham, England). *Ann. R. Coll. Surg. Engl.* 58(5):368-373; 1976.

2184 PROXIMAL GASTRIC VAGOTOMY WITHOUT DRAINAGE PROCEDURE IN PATIENTS WITH PEPTIC ULCER [Abstract]. (Ger.) Haiderer, O.; Jatzko, G. (Landeskrankenh., Klagenfurt, Austria). *Wien. Klin. Wochenschr.* 126(28/31):428-430; 1976.

2185 EVALUATION OF RECURRENT DUODENAL ULCER AFTER VAGOTOMY PYLOROPLASTY. (Eng.) Juler, G. L.; Dagradi, A. E.; Stempien, S. J.; Combs, R. C. (Veterans Admin. Hosp., Long Beach, CA 90822). *Am. J. Surg.* 132(2):243-248; 1976.

2186 ULTRASTRUCTURAL CHANGES IN THE GASTRIC MUCOSA AFTER SELECTIVE PROXIMAL VAGOTOMY [Abstract]. (Eng.) Savola, J.; Aarimaa, M.; Kalimo, H. (Dept. Pathological Anatomy, Univ. Turku, SF-20520 Turku 52, Finland). *Scand. J. Gastroenterol.* 12(Suppl. 45):88; 1977.

2187 IS PROXIMAL GASTRIC VAGOTOMY (PGV) AN ADEQUATE OPERATION IN DUODENAL ULCER PATIENTS WITH HIGH ACID SECRETION [Abstract]?

(Eng.) Roland, M.; Liavag, I. (Aker Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):81; 1977.

2188 MAXIMUM ACID OUTPUT IN DUODENAL ULCER PATIENTS WITH DIFFERENT LENGTH OF ULCER HISTORY AND IN CONTROLS WITHOUT DYSPEPSIA [Abstract]. (Eng.) Kronberg, O.; Christiansen, P. M. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):50; 1977.

2189 PROXIMAL GASTRIC VAGOTOMY WITH SUPRAPYLORIC MUCOSAL ANTRECTOMY FOR DUODENAL ULCER [Abstract]. (Eng.) Kronberg, O. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):49; 1977.

2190 EARLY ENDOSCOPY IN THE PREDICTION OF FURTHER HAEMORRHAGE FROM PEPTIC ULCERS [Abstract]. (Eng.) Foster, D. N.; Miloszewski, K. J. A.; Losowsky, M. S. (Dept. Medicine, Univ. Leeds, Leeds, England). *Gut* 18(11):A987; 1977.

2191 FACTORS AFFECTING THE INCIDENCE AND TREATMENT OF POST-VAGOTOMY DIARRHOEA [Abstract]. (Eng.) Taylor, T. V.; Lambert, M. E.; Torrance, B. (Manchester Royal Infirmary, Manchester, England). *Gut* 18(11):A989; 1977.

2192 PERFORATION OF CHRONIC DUODENAL ULCER DURING TREATMENT WITH CIMETIDINE [Letter to Editor]. (Eng.) Ellis, D. J.; Hamer, J. D.; Baker, S. E. (Queen Elizabeth Hosp., Birmingham, England). *Br. Med. J.* 2(6101):1538; 1977.

2193 VAGOTOMY AND INTRAGASTRIC ACIDITY [Abstract]. (Eng.) McCloy, R. F.; Girvan, D. P.; Baron, J. H. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(11):A947; 1977.

2194 CIMETIDINE AND POSTGASTRECTOMY RECURRENT ULCER [Letter to Editor]. (Eng./Ita.) Delle Fave, G. F.; Paoluzi, P.; Bergonzi, L.; De Magistris, L.; Sparvoli, C.; Carratu, R. (Policlinico Umberto I, Rome, Italy). *Rend. Gastroenterol.* 9(2):150-151; 1977.

2195 AETIOLOGY OF GASTRITIS OCCURRING AFTER SURGERY FOR PEPTIC ULCER [Abstract]. (Eng.) Hoare, A. M.; Chapel, H. M.; Alexander-Williams, J. (Queen Elizabeth Hosp., Birmingham, England). *Gut* 18(11):A955-A956; 1977.

2196 PEPTIC ULCER IN RENAL FAILURE [Abstract]. (Eng.) Doherty, C. C.; O'Connor, F. A.; Buchanan, K. D.; Sloan, J. M.; Ardill, J. E. S.; McGeown, M. G. (Belfast City Hosp., Belfast, Northern Ireland). *Gut* 18(11):A964-A965; 1977.

2197 LONG-TERM EFFECTS OF CIMETIDINE ON GASTRIC SECRETION [Abstract]. (Eng.) Holden, R. J.; Hearns, J. B.; McKibben, B.; Buchanan, K. B.; Crean, G. P. (Southern General Hosp., Belfast, Northern Ireland). *Gut* 18(11):A949; 1977.

2198 EFFECT OF ONE YEAR'S TREATMENT WITH CIMETIDINE ON FASTING AND OXO-STIMULATED SERUM GASTRIN IN DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Spence, R. W.; Celestin, L. R.; McCormick, D. A.; Owens, C. J.; Oliver, J. M. (Frenchay Hosp., Bristol, England). *Gut* 18(11):A949; 1977.

2199 ARE PROSTAGLANDINS DEFICIENT IN PEPTIC ULCERATION [Abstract]? (Eng.) Baker, R.; Jaffe, B. M.; Reed, J. D.; Shaw, B.; Venables, C. W. (Dept. Surgery, Univ. Newcastle upon Tyne, New Castle upon Tyne, England). *Gut* 18(11):A950-A951; 1977.

2200 EFFECTS OF PROXIMAL GASTRIC VAGOTOMY AND TRUNCAL VAGOTOMY AND ANTRECTOMY ON GASTRITIS, BILE REFLUX, AND ACID OUTPUT [Abstract]. (Eng.) Hoare, A. M.; Donovan, I.; Alexander-Williams, J. (Queen Elizabeth Hosp., Birmingham, England). *Gut* 18(11):A950; 1977.

See also, 1713, 1783, 1830, 1842, 1848, 1859, 1980, 1990, 1994, 2000, 2023, 2040, 2043, 2113, 2115, 2116, 2118, 2128, 2129, 2135, 2140, 2142, 2144, 2145, 2150, 2155, 2201, 2535, 2550.

SMALL INTESTINE

2201 PERFUSION OF THE PROXIMAL SMALL INTESTINE WITH PEPTONE STIMULATES GASTRIC ACID SECRETION IN MAN. (Eng.) Isenberg, J. I.; Ippoliti, A. F.; Maxwell, V. L. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 73(4):746-752; 1977.

To test the hypothesis that intestinal stimulants originating in the human proximal small intestine increase gastric acid secretion, the duodenum was infused with 10% peptone (weight/volume, 400 mOsm at 2 ml/min for 4 hr in seven normal subjects and seven duodenal ulcer patients. The duodenum was perfused through a gastroduodenal tube, with two balloons straddling the pylorus to prevent duodenogastric reflux. As a control, 0.2 M NaCl was perfused into the duodenum at 2 ml/min for 4 hr on another day. The order of testing was randomized. Gastric acid secretion increased gradually during duodenal peptone perfusion and reached a peak response during the second hour of infusion. During the second hour of peptone infusion, the mean peak 30-min secretory rate was 203.8 ± 31.9 μEq/min, and during NaCl infusion, it was 87.8 ± 27.2 μEq/min ($p<0.01$). Duodenal perfusion with 0.2 N NaCl did not stimulate acid secretion. Peak 30-min secretory rate after pentagastrin (6 μg/kg, s.c.) measured on another day was 657.6 ± 50.6 μEq/min. The mean peak secretory response during the second hour of duodenal peptone perfusion was 32.6 ± 4.6% of the peak response to pentagastrin. During the time periods when gastric acid secretion was at a peak response, serum gastrin, measured at 30-min intervals throughout both tests, was unchanged from basal and NaCl control. However, the mean serum gastrin did increase slightly (approximately 16 pg/ml) but significantly in the 14 subjects during the last 90 min of duodenal peptone perfusion. Validation experiments revealed good reproducibility of the responses to duodenal peptone or NaCl perfusion, absence of an increase in gastric acid secretion or serum gastrin in response to gastric perfusion of 10% peptone in a volume equivalent to the volume that refluxed during the 4 hr of duodenal peptone perfusion, and no effect on gastric acid secretion or serum gastrin of the gastroduodenal tube with or without inflation of the duodenal and gastric balloons. These studies indicate that there is an intestinal phase of gastric acid secretion in normal man and in patients with duodenal ulcer in response to duodenal peptone perfusion, that it has a latent period of about 1 to 2 hr until the peak response is reached, and that the response is probably not primarily attributable to gastrin release.

2202 CARCINOID TUMORS, VASCULAR ELASTOSIS, AND ISCHEMIC DISEASE OF THE SMALL INTESTINE.

(Eng.) Qizilbash, A. H. (Henderson General Hosp., 711 Concession St., Hamilton, Ontario L8V 1C3 Canada). *Dis. Colon Rectum* 20(7):554-560; 1977.

The incidence of elastic vascular sclerosis and/or ischemia complicating carcinoid tumors was assessed in 21 patients, and the clinical and pathologic features of the condition are presented. Ischemic enteritis or infarction occurred in 4 of 15 patients who had carcinoid tumors of the small intestine. All four, in addition, had elastic vascular sclerosis of the mesenteric vessels. Both arteries and veins were involved, and the change occurred in the region of tumor deposit. In none of the cases was the tumor occluding the lumen of the vessels, nor was there any evidence of thrombosis. Ischemic changes occurred in two of the six patients with large intestinal carcinoid tumors, although elastic vascular sclerosis and infarction were absent. The findings suggest a direct rather than a humoral effect. It appears that cancer cells exert an inductive effect on the fibroblast or smooth muscle cell in vascular walls, causing excess production of elastic tissue.

2203 DUAL IMMUNE DEFECTS IN NONGRANULOMATOUS ULCERATIVE JEJUNOILEITIS WITH HYPOGAMMAGLOBULINEMIA.

(Eng.) Saxon, A.; Stevens, R. H.; Ashman, R. F.; Parker, N. H. (Univ. California Sch. Medicine, Los Angeles, CA 90024). *Clin. Immunol. Immunopathol.* 8(2):272-279; 1977.

Two patients with nongranulomatous ulcerative jejunoileitis with hypogammaglobulinemia were investigated to determine the nature of the immune defect responsible for hypogammaglobulinemia. Analysis of surface receptors revealed that both patients had an absolute number of bone marrow-derived (B) lymphocytes within the normal range. Both patients had an absolute and relative thymus-derived (T) lymphocytopenia. However, their T lymphocytes were capable of providing helper function for normal bone marrow-equivalent lymphocytes in immunoglobulin production. The B lymphocytes demonstrated an intrinsic defect in immunoglobulin production, which was not reversed by the addition of normal T lymphocytes. Neither patient had evidence of excess suppressor cells. Thus, both patients manifested similar dual immune defects, consisting of a qualitative B-lymphocyte block in immunoglobulin production and a quantitative T-lymphocyte deficiency.

2204 ISCHEMIC DISEASE OF THE SMALL BOWEL AND COLON ASSOCIATED WITH ORAL CONTRACEPTIVES.

(Eng.) Ghahremani, G. G.; Meyers, M. A.; Farman, J.; Port, R. B. (Evanston Hosp., 2650 Ridge Ave., Evanston, IL 60201). *Gastrointest. Radiol.* 2(3): 221-228; 1977.

The development of ischemic bowel disease in seven women taking oral contraceptives is reported. The ischemic changes, which involved the ileum in three patients and the colon in four patients, became reversible after conservative management and discontinuance of the agents. The radiologic features of ischemic disease in the small bowel and colon are remarkably similar. The characteristic changes are best visible on barium studies and include mucosal edema, superficial ulcerations, blunting of the valvulae and haustra, transverse ridging, marginal indentations or thumbprints due to submucosal edema and hemorrhage, and thickening of the intestinal wall causing separation of the adjacent loops. Evidence for spasm and irritability of the involved segments may also be seen at fluoroscopy. The subsequent disappearance of the ischemic changes in the above patients was the most important factor in establishing the diagnosis of reversible mesenteric vascular occlusion. It is suggested that conservative management with heparin, dextran infusion, and discontinuance of the contraceptive agent should be attempted in patients without signs of peritoneal irritation and radiographic findings of intestinal necrosis. The persistence or progression of the clinical and radiologic findings indicate the necessity for surgical intervention, because bowel infarction is often insidious when caused by venous occlusion.

2205 A PROSPECTIVE COMPARISON OF GASTRIC AND JEJUNOILEAL BYPASS PROCEDURES FOR MORBID OBESITY. (Eng.) Griffen, W. O., Jr.; Young, V. L.; Stevenson, C. C. (Univ. Kentucky Medical Center, 800 Rose St., Lexington, KY 40506). *Ann. Surg.* 186(4):500-509; 1977.

Gastric and jejunoileal bypass procedures for morbid obesity were compared in a randomized, prospective study of 59 patients. The gastric bypass was performed predominantly as a 90% gastric exclusion with a Roux-en-Y reconstitution. The jejunoileal bypass was an end-to-end anastomosis between 30 cm of jejunum and 25 cm of terminal ileum, the bypassed segment of small bowel being decompressed by an end-to-side ileocolostomy. There were 32 patients in the gastric group and 27 in the jejunoileal group. The two groups were comparable in age, preoperative weight, and height. There were no postoperative deaths, but the gastric bypass operation was associated with a slightly higher early complication rate (62.5% of the cases versus 48%), indicating that it is a more technically demanding procedure. Late sequelae were more prominent in the jejunoileal bypass group and included significant diarrhea in 56% and need for medication in 74%. Kidney stones and cholelithiasis also complicated the jejunoileal group and were not seen after gastric bypass. All patients showed fatty metamorphosis on the original liver biopsy. This had worsened in 75% of the jejunoileal group at 1 yr postoperatively, whereas it had improved or was stable in all patients in the gastric group. The results indicate that once the technique is perfected, gastric bypass is superior to jejunoileal bypass in the treatment of morbid obesity.

2206 CONGENITAL INTRINSIC DUODENAL OBSTRUCTION: A TWENTY-FIVE YEAR REVIEW. (Eng.) Wesley, J. R.; Mahour, G. H. (Children's Hosp. Los Angeles, Los Angeles, CA). *Surgery* 82(5):716-720; 1977.

Factors influencing the prognosis of congenital duodenal obstruction were assessed in 72 patients in whom this condition was diagnosed between 1951 and 1975. The survival rate was 55% during the first 15 yr of the study, but it increased to 88% during the last 10 yr. Factors important to this increased survival rate included earlier diagnosis and expeditious preoperative workup; expert administration of anesthesia; improved surgical technique with a greater awareness for common pitfalls, such as associated duodenal diaphragm or distal bowel atresia; frequent use of gastrostomy; use of parenteral nutrition; and better intensive nursing care.

2207 ADENOMAS (POLYPS) OF THE DUODENUM. (Rus.) Gasmaev, V. K.; Yakushin, V. I. (S. P. Botkin Central Inst. Advanced Training Physicians, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (5):38-44; 1977.

2208 CELIAC MELANOSIS: TWO NEW CASES. (Fre.) Laine, F.; Ramiara, Y. (Hopital des Armees, Bordeaux, France). *Bordeaux Med.* 9(25):2019-2022; 1976.

2209 A CASE OF ILEAL ATRESIA AND ILEOCUTANEOUS FISTULA CAUSED BY AMNIOCENTESIS. (Eng.) Rickwood, A. M. K. (Children's Hosp., Western Bank, Sheffield, England). *J. Pediatr.* 91(2):312; 1977.

2210 NON-OCCLUSIVE ENTERIC GANGRENE ASSOCIATED WITH SEVERE UPPER GASTROINTESTINAL BLEEDING. (Eng.) Wiklund, L.; Grevsten, S.; Nilsson, F.; Norlen, B. J.; Rimsten, A. (Univ. Hosp., S-750 14 Uppsala, Sweden). *Acta Chir. Scand.* 142(8): 593-597; 1976.

2211 HEMORRHAGIC ENTEROPATHY. (Ger.) Brobmann, G. F.; van Lessen, H.; Springorum, H. W.; Thomas, C. (Chirurgischen Universitats-Klinik, Hugstetterstrasse 55, 7800-Freiburg, W. Germany). *Fortschr. Med.* 94(30):1736-1741; 1976.

2212 ALPHA-CHAIN DISEASE AND RELATED SMALL-INTESTINAL LYMPHOMA. REPORT OF A WHO MEETING OF INVESTIGATORS. (Eng.) Bernier, J. J. (World Health Organization Immunology, 1211 Geneva 27, Switzerland). *Arch. Fr. Mal. App. Dig.* 65(8): 591-607; 1976.

2213 ULTRASTRUCTURAL STUDIES OF INTESTINAL MUCOSA FROM CHILDREN WITH LYSOSOMAL STORAGE DISEASES [Abstract]. (Eng.) Vio, P. M. A.; Ginsel, L. A.; Daems, W. T.; van Gemund, J. J.; Cambier, P. H. (No affiliation given). *Acta Paediatr. Belg.* 29(2):135; 1976.

2214 OCCLUSIVE DISEASE OF THE MESENTERIC ARTERIES: A CLINICAL AND RADIOLOGICAL STUDY. (Eng.) Hansen, H. J. B.; Efsen, F. (Rigshospitalet, Univ. Hosp., Lundtoftevej 282, DK-2800 Lyngby, Denmark). *Dan. Med. Bull.* 24(3):117-122; 1977.

2215 PREVENTION AND TREATMENT OF MALFUNCTION OF THE CONTINENT ILEOSTOMY. (Eng.) Grotzinger, U.; Myrvold, H. E.; Kock, N. G. (Sahlgren's Hosp., Goteborg, Sweden). *Chir. Gastroenterol.* 10(4):401-403; 1976.

2216 G.I.P. RESPONSE TO A STANDARD GLUCOSE LOAD IN OBESE PATIENTS BEFORE AND AFTER THE SALMON PROCEDURE [Abstract]. (Eng.) Cleator, I. G. M.; Gourlay, R. H. (St. Paul's Hosp., Vancouver, British Columbia, Canada). *Gastroenterology* 72(5, Part 2):1039; 1977.

2217 MORPHOLOGIC AND BIOCHEMICAL INTESTINAL CHANGES AFTER JEJUNO-ILEAL BYPASS [Abstract]. (Eng.) Daly, J. M.; Castro, G. A.; Akhtar, M.; Dudrick, S. J. (Univ. Texas Medical Sch. Houston, 6400 West Cullen St., Houston, TX 77030). *Gastroenterology* 72(5, Part 2):1042; 1977.

2218 COLONIC CONSERVATION OF CARBOHYDRATE IN JEJUNO-ILEAL BYPASS PATIENTS [Abstract]. (Eng.) Currier, B.; Levitt, M. D.; Buchwald, H.; Bond, J. H. (Veterans Admin. Hosp., Minneapolis, MN). *Gastroenterology* 72(5, Part 2):1042; 1977.

2219 LIVER DISEASE AND NUTRITION AFTER JEJUNO-ILEAL BYPASS FOR OBESITY [Abstract]. (Eng.) Whelan, G. (St. Vincent's Hosp., Melbourne, Australia). *Gastroenterology* 72(5, Part 2):1149; 1977.

2220 FATTY METAMORPHOSIS OF THE LIVER ASSOCIATED WITH JEJUNOILEAL BYPASS. REPORT OF FIVE CASES. (Eng.) Piepkorn, M. W.; Mottet, N. K.; Smuckler, E. A. (Sch. Medicine, Univ. Washington, Seattle, WA 98195). *Arch. Pathol. Lab. Med.* 101 (8):411-415; 1977.

2221 LITHOGENIC INDEX OF BILE AFTER JEJUNOILEAL BYPASS OPERATION FOR OBESITY. (Eng.) Sorensen, T. I. A.; Bruusgaard, A.; Pedersen, L. R.; Krag, E. (Herley Hosp., DK-2730 Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(4):449-451; 1977.

2222 THE EFFECT OF JEJUNOILEOSTOMY ON THE CONCENTRATION OF CERTAIN PLASMA LIPID FRACTIONS IN PATIENTS WITH EXTREME OBESITY. (Pol.) Tuszewski, M.; Smolińska, K. (Klinika Chirurgii Gastroenterologieznej Instytutu Chirurgii AM, ul. Przybyszewskiego 49, 60-355 Poznan, Poland). *Pol. Tyg. Lek.* 31(46):1975-1977; 1976.

See also, 1697, 1700, 1702, 1807, 1815, 1838, 1965, 1967, 1988, 1994, 1995, 1998, 2000, 2003, 2049, 2050, 2104, 2114, 2116, 2117, 2120, 2137, 2138, 2142, 2153, 2157, 2161, 2179, 2180, 2181, 2232, 2241, 2245, 2246, 2273, 2285, 2296, 2306, 2531, 2541, 2542, 2561, 2573, 2578, 2581, 2583, 2586, 2588, 2596, 2601, 2609, 2610, 2622, 2623.

SMALL INTESTINE

Malabsorption

2223 AMINO ACID AND PEPTIDE ABSORPTION IN PATIENTS WITH COELIAC DISEASE. (Eng.) Clark, M. L.; Fairclough, P. D.; Silk, D. B. A. (St. Bartholomew's Hosp., London, England). *Z. Ernaehrungswiss.* 20(Suppl.):32-37; 1977.

The absorption of amino acids and peptide was studied in adults to clarify the degree to which malabsorption of dietary protein contributes to the protein deficiency seen in some cases of celiac disease. Absorption of amino acids from perfused solutions was compared in eight normal subjects and seven patients with untreated celiac disease. The isotonic solutions contained the dipeptide glycyl-L-alanine (10 mM) or the same amino acids in the free form, 25 mM bicarbonate, and polyethylene glycol (PEG, 2.5 g/l), labeled with ^{14}C PEG (1 μCi/l). There was a significant reduction in absorption rates of both glycine and L-alanine from the mixture of free amino acids in the jejunum of celiacs when compared to the normal subjects ($p<0.02$). Mean total amino acid absorption in the celiac patients was reduced up to 40% of the control values. There was a significant ($p<0.001$) reduction in both glycine and L-alanine absorption from dipeptide solution in the celiacs. Comparable levels of free amino acids occurred in celiacs and normal subjects during jejunal perfusion of dipeptide, and there was no significant difference between luminal peptidase in both groups, indicating that back diffusion of free amino acids is increased in celiac disease. Ileal absorption of amino acids and peptide was normal in celiacs. The studies demonstrate that free amino acid and peptide absorption in the jejunum of celiac patients were impaired to the same degree. As total amino acid absorption was more rapid from dipeptide than from free amino acid solution, the use of peptide-containing elemental diets in celiac patients is recommended if rapidity of amino acid absorption is desirable.

2224 FACTORS RESPONSIBLE FOR WEIGHT LOSS IN TROPICAL SPRUE. (Eng.) Klipstein, F. A.; Corcino, J. J. (Univ. Rochester Medical Center, 601 Elmwood Ave., Rochester, NY 14642). *Am. J. Clin. Nutr.* 30(10):1703-1708; 1977.

The respective roles of reduced dietary intake and malabsorption in the pathogenesis of weight loss in 45 patients with chronic tropical sprue were evaluated. Dietary intake was significantly ($p<0.001$) less in the patients with tropical sprue (all of whom had anorexia due to deficiency of folate and/or vitamin B_{12}) than in 51 healthy Puerto Ricans. Weight loss was equally prominent in those patients with tropical sprue who had normal absorption of fat and protein as in those who had excessive fecal loss and reduced absorption of these nutrients.

Treatment of five sprue patients with folic acid or vitamin B_{12} for 2 weeks resulted in improved appetite and increase in dietary intake with weight gain in the absence of significant improvements in intestinal absorption. Treatment with p.o. tetracycline for a similar period of time in five other patients was not associated with vitamin repletion, return of appetite, or weight gain. These observations indicate that reduced dietary intake resulting from anorexia caused by vitamin deficiency is a significant, and sometimes the most important, factor in the pathogenesis of weight loss in persons with chronic tropical sprue.

2225 MALABSORPTION FOLLOWING RADIATION THERAPY. (Eng.) Burbige, E. J.; Tarder, G. L.; Belber, J. P. (Veterans Admin. Hosp., 150 Muir Rd., Martinez, CA 94553). *Am. J. Gastroenterol.* 67(6): 589-592; 1977.

The case is presented of a patient with transitional cell carcinoma of the bladder who developed diarrhea following radiotherapy and was treated symptomatically for 9 yr with the assumption that the diarrhea was secondary to radiation enteritis. Further evaluation, including endoscopic cholangiopancreatography, revealed pancreatic insufficiency with steatorrhea as the probable cause of the patient's diarrhea. Although temporally related to radiation therapy, the etiology of his pancreatic insufficiency remains speculative. All patients developing diarrhea and/or malabsorption following radiotherapy should be evaluated thoroughly for treatable causes.

2226 INTESTINAL MICROFLORA AND RESORPTION. (Ger.) Knoke, M.; Bernhardt, H. (Medizinischen Universitats-Klinik, Freiedrich-Loefler-Strasse 23a, 22 Greifswald, Germany). *Z. Gesamte Inn. Med.* 31(17):679-684; 1976.

2227 TRH INDUCED TSH RELEASE IN COELIAC DISEASE [Abstract]. (Eng.) Eggermont, E.; Vanderschueren-Lodeweyckx, M.; Molla, A.; Eeckels, R.; Malvaux, P.; Beckers, C. (No affiliation given). *Acta Paediatr. Belg.* 29(2):127; 1976.

2228 GASTRIC SECRETORY FUNCTION IN COELIAC DISEASE [Abstract]. (Eng.) Marcello, U.; Consolaro, G.; Zoppi, G. (No affiliation given). *Acta Paediatr. Belg.* 29(2):133; 1976.

2229 ULTRASTRUCTURAL LOCALIZATION OF IMMUNOGLOBULINS IN NORMAL AND COELIAC INTESTINAL MUCOSA USING PEROXIDASE-LABELLED ANTIBODIES [Abstract]. (Eng.) Jos, J.; Labbe, F. (No affiliation given). *Acta Paediatr. Belg.* 29(2):128; 1976.

2230 VITAMIN B_6 IN DUODENAL MUCOSA AND IN SERUM OF CHILDREN WITH COELIAC DISEASE [Abstract]. (Eng.) Reinken, L.; Zieglauer, H.; Berger, H. (No affiliation given). *Acta Paediatr. Belg.* 29(2):127-128; 1976.

2231 A COMPARISON OF THE IMMUNOPATHOLOGY OF MILK ALLERGY AND COELIAC DISEASE [Abstract]. (Eng.) Shiner, M.; Ballard, J.; Smith, M. (No affiliation given). *Acta Paediatr. Belg.* 29(2):127; 1976.

2232 HYPEROXALURIA IN CHILDREN WITH HEPATIC, PANCREATIC, AND INTESTINAL DYSFUNCTION [Abstract]. (Eng.) McCollum, J. P. K.; Ogilvie, D.; Muller, D. P. R.; Packer, J. S.; Harries, J. T. (No affiliation given). *Acta Paediatr. Belg.* 29 (2):133; 1976.

2233 THE EFFECT OF SUCROSE MALABSORPTION ON THE PATTERN OF GROWTH IN CHILDREN [Abstract]. (Eng.) Krasilnikoff, P. A.; Gudmand-Hoyer, E. (No affiliation given). *Acta Paediatr. Belg.* 29(2):132; 1976.

2234 A STUDY OF THE MOLECULAR ALTERATIONS IN CONGENITAL SUCROSE INTOLERANCE (CSI) AND CONGENITAL ENTEROKINASE DEFICIENCY (CED) [Abstract]. (Eng.) Schmitz, J.; Honegger, J.; Tarlow, M. J.; Hadorn, B.; Rey, J. (No affiliation given). *Acta Paediatr. Belg.* 29(2):130; 1976.

See also, 1732, 1965, 1996, 2031, 2120, 2154, 2156, 2303, 2322, 2466, 2546, 2549, 2583, 2598, 2609.

LARGE INTESTINE

2235 ADYNAMIC BOWEL SYNDROME: REPORT OF A CASE WITH DISTURBANCE OF THE CHOLINERGIC INNERVATION. (Eng.) Puri, P.; Lake, B. D.; Nixon, H. H. (Hosp. Sick Children, London, England). *Gut* 18(9):754-759; 1977.

The case of an infant with adynamic bowel syndrome is described. Full thickness biopsies of the large bowel showed the presence of ganglion cells; no acetylcholinesterase-positive nerves in the lamina propria, submucosa, or among the smooth muscle cells of the circular and longitudinal muscle coats; and absence of the argyrophil plexus. Electron microscopy showed replacement of the normal axon bundle by vacuolated tracts with small round bodies, probably viral, in one area. Neuronal cytoplasm also showed similar vacuolation. The patient was successfully treated with an ascending colon loop colostomy, which was later transformed to an end ileostomy. It is suggested that the damage to the cholinergic innervation may be caused by a neurotoxic agent.

2236 ANGIODYSPLASIA OF THE RIGHT COLON: A CAUSE OF GASTROINTESTINAL BLEEDING. (Eng.)

Baum, S.; Athanasoulis, C. A.; Waltman, A. C.; Galdabini, J.; Schapiro, R. H.; Warshaw, A. L.; *et al.* (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Am. J. Roentgenol.* 129(5): 789-794; 1977.

Clinical experience with angiodysplasia of the right colon and cecum in 34 patients is presented, and the diagnostic importance of mesenteric arteriography in patients with chronic lower intestinal bleeding is emphasized. The patients had intermittent lower gastrointestinal bleeding and were diagnosed angiographically as having angiodysplasia of the cecum or right colon. Repeated barium and endoscopic examinations were negative. Right colectomy was carried out in 17 patients, who were followed postoperatively for up to 7 yr. Of these, four patients rebled, two of whom had angiographic evidence of related lesions involving other parts of the colon and terminal ileum. Silicone rubber injection and tissue-clearing techniques on the specimens facilitated the pathologic identification of these lesions. Histologically, they were seen to be dilated submucosal veins and arteries associated with areas of overlying mucosal thinning and occasional ulcerations. Although the pathogenesis of the lesion is unknown, they are probably acquired rather than congenital and result from chronic submucosal arteriovenous shunting secondary to mucosal ischemia. Of the 34 patients, 17 had a history of cardiac disease.

2237 FEASIBILITY OF FECAL OCCULT-BLOOD TESTING FOR DETECTION OF COLORECTAL NEOPLASIA: DEBITS AND CREDITS. (Eng.)

Winawer, S. J.; Miller, D. G.; Schottenfeld, D.; Leidner, S. D.; Sherlock, P.; Befler, B.; *et al.* (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *Cancer* 40(5, Suppl.):2616-2619; 1977.

A screening program for colorectal cancer and adenomas was applied to 6,579 mostly asymptomatic men and women age 40 yr and older utilizing fecal occult blood testing followed by investigation of patients with positive slides by air-contrast barium enema and colonoscopy. A control population of 7,325 patients had sigmoidoscopy only and no occult blood testing. Approximately 1% of the patients had positive slides; most patients had only one or two positive slides. Approximately 50% of patients with positive slides had significant neoplastic lesions, including 23 patients with large adenomas and 7 patients with cancers. Pathological staging of cancer was more favorable in the screened asymptomatic group as compared with the control group. Neoplastic lesions seen on sigmoidoscopy in screened patients who had negative fecal occult blood tests included 2 cancers and 15 large adenomas. The false-negative results may have been due to conversion of initially positive slides to negative. Screening for colorectal cancer and adenomas with fecal occult blood testing appears to be a feasible approach with good patient compliance, and a manageable rate of positive slides productive of a high percentage of neoplastic lesions. The number of false-positives seems to be low.

2238 AGE-RELATED IMPAIRMENT OF TUMOR-ASSOCIATED LYMPHOCYTOTOXICITY IN PATIENTS WITH COLONIC ADENOCARCINOMA. (Eng.)

Goldrosen, M. H.; Rohrdanz, D.; Sabatino, B.; Burns, G. P.; Holyoke, E. D. (Roswell Park Memorial Inst., New York State Dept. Health, 666 Elm St., Buffalo, NY 14263). *Dis. Colon Rectum* 20(7):561-565; 1977.

The *in vitro* lymphocytotoxic responses of 27 preoperative patients with colon carcinoma and 61 healthy volunteers were correlated with age by linear regression analysis. The patients ranged in age from 34 to 88 yr (average 61.7), and the controls ranged from 16 to 88 yr (average 45.8). Cytotoxicity obtained with WBC from the cancer patients on the colonic cancer-cell line decreased with increasing age ($r=0.66$, $p \leq 0.01$). In contrast, cytotoxicity obtained with WBC from the controls on the same cell line did not correlate with age of the donor. Furthermore, the decline in cytolysis in the patient group could not be attributed to more extensive disease. These observations suggest that increasing age is an important factor associated with the decline in ability of colorectal cancer patients to generate a disease-related cytolytic reaction.

2239 ULTRASTRUCTURE OF THE "TRANSITIONAL" MUCOSA ADJACENT TO LARGE BOWEL CARCINOMA. (Eng.)

Riddell, R. H.; Levin, B. (Univ. Chicago Hosp. and Clinics, 950 East 59th St., Chicago, IL 60637). *Cancer* 40(5, Suppl.):2509-2522; 1977.

The transitional mucosa immediately adjacent to large bowel carcinoma was examined in 13 patients by scanning electron microscopy (SEM), and the results were correlated with those of transmission electron microscopy (TEM) and of light microscopy (LM). Marked abnormalities, including distortion and loss of the normal architecture, were present in this mucosa in nine patients. In all patients, the transitional mucosa was compared with two pieces of normal mucosa; in one patient, typical changes of transitional mucosa were found in this region. In the remaining patients, normal mucosa by SEM was found to consist of large deep furrows (primary crypts) as well as the crypts of Lieberkuhn (secondary crypts). The secondary crypt structure showed marked individual variation between patients, but one type was present in nine patients. It is uncertain whether this is a pattern with a high incidence in the general population, or whether patients with this type of mucosa are particularly predisposed to large bowel carcinoma. SEM may, therefore, play a part in identifying patients particularly likely to develop large bowel carcinoma.

2240 ANTIBIOTIC-INDUCED COLITIS: IMPLICATION OF A TOXIN NEUTRALISED BY Clostridium sordellii ANTITOXIN. (Eng.) Rifkin, G. D.; Fekety, F. R.; Silva, J., Jr.; Sack, R. B. (Univ. Hosp., Ann Arbor, MI 48109). *Lancet* 2(8048):1103-1106; 1977.

The feces of two patients with antibiotic-induced colitis were examined for the presence of toxin(s). A heat-labile toxin(s) was demonstrated in the stools of both patients. This toxin(s) was rapidly lethal to hamsters, increased the vascular permeability in rabbit skin, and was cytotoxic to cells in tissue culture. It was neutralized by *Clostridium sordellii* antitoxin but not by antitoxins prepared against other clostridia or against *Escherichia coli* and *Vibrio cholerae* toxins. These characteristics were identical to those of a toxin implicated in the etiology of antibiotic-induced colitis in the hamster. One patient improved rapidly after treatment with p.o. vancomycin, and at the same time the toxin disappeared from the stool.

2241 ISCHEMIC BOWEL DISEASE FOLLOWING BILATERAL NEPHRECTOMY OR RENAL TRANSPLANT. (Eng.) Margolis, D. M.; Etheredge, E. E.; Garza-Garza, R.; Hruska, K.; Anderson, C. B. (Barnes and Wahl Hosp., 4960 Audubon Ave., St. Louis, MO 63110). *Surgery* 82(5):667-673; 1977.

The case reports of five patients who developed pathologically proved ischemic bowel disease (IBD) following either renal transplantation or bilateral nephrectomy in preparation for transplantation during a 2-yr period are presented. This entity accounted for 42% of all major gastrointestinal complications in one transplant unit. Three patients presented with abdominal pain and ileus, and two patients developed massive lower gastrointestinal hemorrhage. All five patients had nonocclusive ischemic disease because obstruction of a major intestinal vessel could not be documented in any case. Each patient was treated with bowel resection, and three of the five patients survived. Although sepsis, shock, and large doses of immunosuppressive drugs have been implicated in predisposing such patients to IBD, these factors were not uniformly present in these cases. Blood volume redistribution with transient episodes of hypotension, especially during postoperative hemodialysis, may be significant. IBD in uremic patients can occur in the presence or absence of renal transplantation and may be the cause of massive intestinal hemorrhage in these individuals.

2242 VALUE OF A SINGLE FORCEPS BIOPSY OF COLONIC POLYPS. (Eng.) Livstone, E. M.; Troncale, F. J.; Sheahan, D. G. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Gastroenterology* 73(6):1296-1298; 1977.

The accuracy of colonoscopic biopsies in predicting the histological diagnosis of colonic polyps removed at colonoscopy or at laparotomy was studied in 42 patients who were colonoscoped before the removal of 50 polyps. A single fractional biopsy was obtained from each lesion with the standard endoscopic biopsy forceps and was compared to the final histological diagnosis of each excised lesion. The fractional biopsy measured 2-3 mm in diameter in each case. Thirteen (26%) of the singular fractional biopsies did not demonstrate the significant histological features of the excised polyps. These tiny biopsies do not adequately represent the entire polyp. Moreover, the small size of the biopsy does not permit the study of the central submucosal area of the polyp stalk, the critical area for assessing invasive malignancy. Histological examination of a completely excised polyp is essential for accurate diagnosis and appropriate therapy.

2243 STUDIES ON THE EFFECT OF CARCINOEMBRYONIC ANTIGEN (CEA) ON THE LYMPHOCYTOTOXICITY IN PATIENTS WITH COLORECTAL CARCINOMAS [Abstract]. (Eng.) Eder, E.; Warnatz, H.; Wopfner, F. (Inst. Clinical Immunology, Erlangen, W. Germany). *Z. Immunitatsforsch.* 153(4):296-297; 1977.

2244 POLYPOSIS ADENOMATA COLI CIRCUMSCRIPTA [Abstract]. (Eng.) Kanazawa, K. (Tokyo Metropolitan Geriatric Hosp., Yoikuin, Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):332-333; 1977.

2245 TRANSMISSION AND SCANNING ELECTRON MICROSCOPIC STUDIES ON THE FAMILIAR ADENOMATOSIS OF THE COLON AND THE PEUTZ-JEGHERS POLYPOSIS [Abstract]. (Eng.) Ogata, T. (Okayama Univ. Medical Sch., Okayama, Japan). *Gastroenterol. Jpn.* 12(4):332; 1977.

2246 UPPER GASTROINTESTINAL LESIONS IN FAMILIAL POLYPOSIS COLI [Abstract]. (Eng.) Iida, M.; Yao, T. (Dept. Internal Medicine II, Kyushu Univ., Fukuoka, Japan). *Gastroenterol. Jpn.* 12(4):331; 1977.

2247 PATHOLOGICAL AND GENETIC CONSIDERATIONS OF COLONIC MANIFESTATIONS OF ADENOMATOSIS COLI [Abstract]. (Eng.) Utsonomiya, J.; Iwama, T. (Tokyo Medical and Dental Univ., Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):330; 1977.

2248 CRYOHEMORRHOIDECTOMY [Abstract]. (Eng.) Asp, K.; Kalima, T.; Jarvinen, P.; Aromaa, U. (II. Chir. Univ. Klinik, Hartmannintatu 4, SF-00290 Helsinki, Finland). *Langenbecks Arch. Chir.* 345:614; 1977.

2249 CEA LEVELS IN RECTAL CANCER PATIENTS TREATED BY RADIATION [Abstract]. (Eng.) Bone, G.; Koch, M.; Pearson, J. G.; Hayward, R.

W. W. Cross Cancer Inst., Edmonton, Alberta, anada). *Clin. Res.* 25(5):687A; 1977.

2250 INTESTINAL LYMPHOSARCOMA IN CHILDREN. (Fre.) Bondonny, J. M.; Hehunstre, J. P.; Bechraoui, T.; Mezy, G. (Hopital des Enfants, 168 Cours de l'Argonne, 33077 Bordeaux Cedex, France). *Med. Infant. (Paris)* 83(5):607-625; 1976.

2251 ANORECTAL MANOMETRY: PROBLEMS AND RELIABILITY. (Ger.) Holschneider, A. M. (Dr. von Haunersches Kinderspital, Lindwurmstr. 4, 8000 Munich 2, W. Germany). *Z. Gastroenterol.* 15(3): 215-221; 1977.

2252 RECOMMENDATIONS FOR RETROGRADE X-RAY CONTRAST VISUALIZATION OF THE COLON (BASIC PROGRAM). (Ger.) Anonymous. (Gesellschaft fur Medizinische Radiologie der DDR, Schumannstr. 20/21, 104 Berlin, E. Germany). *Radiol. Diagn. (Berl.)* 18(1):77-81; 1977.

2253 CLEANSING OF THE COLON BY WHOLE GUT IRRIGATION. (Fle.) Bartelsman, J. F.; Padmos, M.; Tytgat, G. N. (Wilhelmina Gasthuis, Afd. Gastro-enterologie, Eerste Helmerstraat 104, Amsterdam Out-West, Netherlands). *Tijdschr. Gastroenterol.* 19(6):417-422; 1976.

2254 APPLICATION OF TOTALLY ABSORBABLE NUTRITIVE CONFECTION USED BY ASTRONAUTS TO ALIMENTARY TRACT DISEASES. (Rus.) Bojanowicz, K.; Berner, J. (Clinic Gastroenterology, Inst. Internal Medicine, Lodz, Poland). *Postepy Astronautyki* 10(1):89-101; 1977.

2255 ORTHOGRADE INTESTINAL LAVAGE IN THE PREOPERATIVE PREPARATION FOR COLONIC SURGERY. (Ger.) Hirt, H. J.; Stock, W.; Schaal, K. P. (Chirurgische Universitatsklinik, D-5000 Cologne 41, W. Germany). *Zentralbl. Chir.* 102(9):569-570; 1977.

2256 EXPERIMENTAL STUDY OF THE SEPARATION OF RECTOSIGMOID SUTURES. (Fre.) Elghozi, L. (No affiliation given). *J. Chir. (Paris)* 113(2): 197-202; 1977.

2257 FUNCTIONAL COLONOPATHIES (OTHER THAN CONSTIPATION). (Fre.) Hardouin, J. P. (Hopital Louis-Mourier, Service du Pr. Ag. J. P. Hardouin, 92701 Colombes Cedex, France). *Rev. Fr. Gastroenterol.* (128):5-24; 1977.

2258 CARCINOMA OF THE LARGE INTESTINE. GENERAL CLINICAL ASPECTS. (Spa.) Trujillo Rodriguez, L.; Cordero Fernandez, M. C.; Dominguez Moliner, A.; De La Santa Lopez, J. (Ciudad Sanitaria "Virgen del Rocio," Seville, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(4):419-426; 1977.

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2286 CASUISTIC CONTRIBUTION TO A NEW CLASSIFICATION OF POLYPOSIS SYNDROME OF THE GASTROINTESTINAL TRACT. (Ger.) Clavadetscher, P.; Haldy, P.; Hammer, B.; Gloor, F.; Deyhle, P.; Ammann, R. (Optingenstrasse 8, CH-3013 Bern, Switzerland). *Schweiz. Med. Wochenschr.* 107(9):307-312; 1977.

See also, 1967, 1984, 1995, 2021, 2041, 2047, 2050, 2121, 2204, 2211, 2218, 2232, 2287, 2290, 2291, 2293, 2294, 2295, 2296, 2501, 2541, 2542, 2553, 2558, 2569, 2570, 2573, 2578, 2581, 2586, 2609, 2610, 2619, 2622, 2625, 2626.

Ulcerative Colitis

2287 SEVERE COLITIS IN CHILDREN AND ADOLESCENTS: DIAGNOSIS, COURSE, AND TREATMENT. (Eng.) Werlin, S. L.; Grand, R. J. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 73(4, Part 1):828-832; 1977.

Nineteen children with severe colitis (14 with ulcerative colitis and 5 with Crohn's colitis) were analyzed according to newly established criteria. There were 8 boys and 11 girls (mean age 12.3 ± 3.8 yr), and duration of acute illness ranged from 2 to 56 days at the time of presentation. Six episodes responded to medical management within 12 days; one episode responded at 3 weeks, one at 4 weeks, and one had not responded when the patient was lost to follow-up. Extending the period of medical treatment beyond 12 days substantially increased morbidity and complications of therapy. No combination of criteria accurately predicted those patients who would respond to medical therapy alone. Ten episodes unresponsive to medical treatment required surgery for control of disease. Of nine patients initially treated with medical therapy alone, five required proctocolectomy for intractable disease in the 2-yr period after the severe attack; three others are doing poorly on a medical regimen (1.5-2.5 yr later), and only one is in remission (5 yr after the severe attack). The data demonstrate that 32% of children with severe colitis had a rapid response to medical management, but the remission achieved was short-lived. The majority of pediatric patients with severe colitis require surgery within 2 yr of the onset of the attack.

2288 THE DETECTION OF SEROLOGICAL FACTORS IN ACUTE ULCERATIVE COLITIS INDICATING A FAVOURABLE SHORT-TERM PROGNOSIS. (Eng.) Hunt, P. S.; Trotter, S. (Prince Henry's Hosp., St. Kilda Rd., Melbourne, Victoria 3004, Australia). *Aust. N.Z. J. Surg.* 46(1):88-91; 1976.

The significance of a possible interplay between autologous serum and lymphocytes in relation to the short-term natural history of acute ulcerative colitis was investigated. Large intestinal epithelial cells were obtained from surgical specimens and by biopsy at sigmoidoscopy from 16 patients with acute severe mucosal ulcerative colitis and 11 controls with normal large bowel mucosa. The ability of lymphocytes to release ^{51}Cr label from large intestinal epithelial cells was quantitatively assessed as percentage lymphocyte activity. The mean lymphocyte activity in 16 patients with acute ulcerative colitis on admission (88 ± 8%) was significantly greater than that in 11 normal subjects (16 ± 8%, $p<0.01$). In each study, samples of autologous serum were added to two reactions between lymphocytes and autologous large intestinal epithelial cells. The results in the seven patients who came to urgent colectomy differed significantly from those in the nine who responded to corticosteroids (44 ± 16% versus 12 ± 5%). When the serum of these patients was studied for immunofluorescent autoantibodies to normal human colonic mucosa, none of the seven patients treated by colectomy had detectable autoantibodies, as compared with three of the nine patients who responded to steroid treatment. The results support a previous suggestion that serological factors (i.e., anticolon antibodies) may account for the remissions and exacerbations of ulcerative colitis.

2289 FURTHER STUDIES OF SULPHASALAZINE METABOLISM IN THE TREATMENT OF ULCERATIVE COLITIS. (Eng.) Cowan, G. O.; Das, K. M.; Eastwood, M. A. (Western General Hosp., Edinburgh EH4 2XU, Scotland). *Br. Med. J.* 2(6094):1057-1059; 1977.

Sixty-four outpatients receiving maintenance treatment with sulphasalazine for ulcerative colitis were studied to relate disease activity to serum concentrations of sulphapyridine. Of 43 patients in remission, 32 had serum sulphapyridine levels >20 µg/ml. Ten of the 21 patients with active disease were taking inadequate doses of sulphasalazine, as indicated by low serum sulphapyridine levels, and of the remaining 11 patients who had serum levels >20 µg/ml, 9 had fecal stasis proximal to active distal colitis and went into remission when treated with hydrophilic colloid or bran and an unchanged sulphasalazine dosage. This suggests that to be effective the metabolites of sulphasalazine must be delivered in the feces to the lumen of the diseased distal segment of the colon. Because high serum concentrations of sulphapyridine produce side-effects, slow acetylators of sulphapyridine need lower doses of sulphasalazine. Estimations of serum sulphapyridine concentrations, as well as identifying the patient's acetylation phenotype, can also be useful in assessing whether the patient is taking the medication at regular intervals.

2290 CANCER IN COLITIS: ASSESSMENT OF THE INDIVIDUAL RISK BY CLINICAL AND HISTOLOGICAL CRITERIA. (Eng.) Lennard-Jones, J. E.; Morson, B. C.; Ritchie, J. K.; Shove, D. C.; Williams, C. B. (St. Mark's Hosp., City Rd., London ECIV 2PS, England). *Gastroenterology* 73(6):1280-1289; 1977.

To test the concept that histological examination of sequential biopsy specimens can detect patients with colitis who are at special risk of developing cancer, the cancer risk among 229 patients with extensive ulcerative colitis observed during January 1, 1966 to February 29, 1976 was correlated with the length of history and the histological findings in rectal and colonic biopsies. Five patients are known to have developed carcinoma. No carcinoma was observed in 578 patient-years of follow-up within 10 yr of onset of the colitis, but the risk in the second decade was approximately 1 in 200 patient-years and, in the third, 1 in 60 patient-years. Severe epithelial dysplasia was rare and was found in 32 biopsies from 13 patients. No carcinoma has occurred during the period of follow-up in patients without dysplasia. It was not possible to follow the development of dysplasia in sequential biopsies. Seven patients with consistent severe dysplasia on biopsy have been treated surgically; carcinoma confined to the bowel wall (Dukes' A) was found in four patients. A scheme of management for patients with extensive colitis, including regular rectal and colonic biopsies, is proposed. The results suggest that such a program will isolate a small group of patients who require surgical treatment for established precancerous change or carcinoma with a high likelihood of cure.

2291 EARLY DETECTION AND PREVENTION OF CARCINOMA OF THE COLON IN PATIENTS WITH ULCERATIVE COLITIS. (Eng.) Dobbins, W. O., III; Stock, M.; Ginsberg, A. L. (2150 Pennsylvania Ave., N.W., Washington, DC 20037). *Cancer* 40(5, Suppl.):2542-2548; 1977.

The available methods for the early detection and prevention of colonic carcinoma in patients with ulcerative colitis are reviewed. These methods include detection of precancer (carcinoma *in situ*) in rectal and colonic biopsies, with and without immunoperoxidase staining for carcinoembryonic antigen; detection of persistently elevated serum carcinoembryonic antigen; roentgenologic detection; colonoscopic detection; cytologic detection; and simple recommendation of total colectomy in all patients with continuously active, extensive colitis after 10 yr of disease. Of the methods available, only detection of precancer in rectal and colonic biopsies holds promise for the early detection of colonic carcinoma, and there are many pitfalls with this method. Precancer, when analyzed in total colectomies, is absent in 12% of patients with carcinoma complicating ulcerative colitis and is found in the rectum in only 66% of these patients. Thirteen percent of patients with severe ulcerative colitis requiring colectomy have precancer in the absence of cancer. Precancer, when analyzed in rectal biopsies of patients with ulcerative colitis, is found in 5.7% of the patients. One study showed that 32% of those patients with precancer in rectal biopsy had colonic carcinoma, while two-thirds of these patients did not have colonic cancer. The role of colonoscopy at regular intervals with the collection of multiple biopsies throughout the colon is currently being evaluated in hopes that this method will more accurately and consistently permit early detection of precancer and cancer in patients with ulcerative colitis of 10 or more years' duration.

2292 HUMORAL IMMUNE SYSTEM IN INFLAMMATORY BOWEL DISEASE: I. COMPLEMENT LEVELS. (Eng.) Hodgson, H. J. F.; Potter, B. J.; Jewell, D. P. (Royal Free Hosp., London, England). *Gut* 18(9):749-753; 1977.

Serum levels of complement components Clq, C4, C3, and Properdin factor B, from the classical and alternative pathways of complement activation, were estimated in 93 patients with ulcerative colitis and 66 patients with Crohn's disease. C3, factor B, and, to some extent, C4 concentrations all increased when the disease was active. In remission, the levels of these components did not differ from those in 31 hospital control patients. There was no evidence for the preferential consumption of the proteins of either pathway of activation, even in those patients with evidence of circulating immune complexes.

2293 ULCERATIVE COLITIS, ANTI-B LYMPHOCYTOTOXIN AND ANTICOLON ANTIBODIES IN A PATIENT WITH HUMORAL IMMUNODEFICIENCY: DIGESTIVE AND IMMUNOLOGIC INVESTIGATIONS [Abstract]. (Eng.) Matuchansky, C.; Messing, B.; Turcz, T.; Galian, A.; Preud'homme, J. L.; Bernier, J. J. (Hopital St-Lazarre, Paris, France). *Digestion* 16(1/2):215; 1977.

2294 RISK OF CANCER IN ULCERATIVE COLITIS [Abstract]. (Fre.) Devroede, G. (No affiliation given). *Cancer Immunol. Immunother.* 3(Suppl.):S8; 1977.

2295 SULPHASALAZINE RECTAL ENEMAS: TOPICAL METHOD OF INDUCING REMISSION OF ACTIVE ULCERATIVE COLITIS AFFECTING RECTUM AND DESCENDING COLON. (Eng.) Serebro, H.; Kay, S.; Javett, S.; Abrahams, C. (Brenthurst Clinic, Parktown, Johannesburg, South Africa). *Br. Med. J.* 2(6097):1264; 1977.

2296 "BACKWASH ILEITIS" WITH PSEUDOPOLYPOSIS. (Eng.) Gardiner, G. A. (Loma Linda Univ. Sch. Medicine, Loma Linda, CA 92354). *Am. J. Roentgenol.* 129(3):506-507; 1977.

See also, 2278, 2628.

PANCREAS

2297 NEEDLE ASPIRATION BIOPSY OF THE PANCREAS AT LAPAROTOMY. (Eng.) Kline, T. S.; Abramson, J.; Goldstein, F.; Neal, H. (Lankenau Hosp., Lancaster and City Line Ave., Philadelphia, PA 19151). *Am. J. Gastroenterol.* 68(1):30-33; 1977.

Six years of experience with thin needle aspiration biopsies obtained from the pancreas during laparotomy on 56 patients is presented. An 18- to 22-gauge spinal needle attached to a disposable syringe was used. The specimens were fixed immediately and stained according to the method of Papanicolaou. The accuracy was 94% for 36 carcinomas and there were no false-positives in the 20 benign lesions. In this series, 21/56 had rapid diagnosis by this method during surgery and in 4, the Whipple operation was performed successfully. The safety, ease of interpretation, and high accuracy of this method make this an extremely useful procedure.

2298 PANCREATIC CANCER SCREENING: ANALYSIS OF THE PROBLEM AND THE ROLE OF RADIONUCLIDE IMAGING. (Eng.) Hall, T. J.; Cooper, M.; Hughes, R. G.; Levin, B.; Skinner, D. B.; Moossa, A. R. (Univ. Chicago, Pritzker Sch. Medicine, Chicago, IL). *Am. J. Surg.* 134(5):544-548; 1977.

The clinical, surgical, and pathologic findings in a 5-yr prospective study of 192 patients referred with a high probability of pancreatic cancer are reported. The requirements of any pancreatic imaging procedure were defined as its ability to distinguish a normal pancreas from pancreatic cancer or chronic pancreatitis and the capability of detecting tumors <5 cm in diameter. There was a 47% incidence of pancreatic disease (27% pancreatic cancer and 20% chronic pancreatitis). Prospective radionuclide imaging (^{75}Se-selenomethionine) was of little clinical value in this patient population; it was neither specific nor sensitive to pancreatic cancer or chronic pancreatitis. Preliminary data with longitudinal multiplane emission tomography show an improved diagnostic accuracy and the ability to detect resectable tumors, but its efficacy needs to be prospectively compared with other screening tests on a carefully defined patient population.

2299 THE PROSPECTIVE EVALUATION OF TUMOUR-ASSOCIATED ANTIGENS FOR THE EARLY DIAGNOSIS OF PANCREATIC CANCER. (Eng.) Wood, R. A. B.; Moossa, A. R. (Ninewells Hosp. and Medical Sch., Dundee, Scotland). *Br. J. Surg.* 64(10):718-720; 1977.

In a study of the validity of assaying tumor-associated antigens for the early diagnosis of pancreatic cancer, blood was obtained from 136 unselected patients suspected of having a major intra-abdominal pathological condition and was stored as serum. A definitive histological diagnosis was made in all cases, usually by laparotomy. Thirty-eight patients had pancreatic cancer. The serum was analyzed with coded samples for carcinoembryonic antigen, alpha fetoprotein, and pancreatic oncofetal antigen, and all recorded levels above the upper limit of normal for that test were taken as positive results (≥ 5.0 ng/ml and ≥ 40 ng/ml for carcinoembryonic antigen and alpha fetoprotein, resp.; oncofetal antigen was graded on a 0 to +++ scale, with $\geq$+ taken as a positive result). The results were analyzed to give the predictive value of a positive test and of a negative test for each antigen. A negative pancreatic oncofetal antigen test was found to be useful in excluding a diagnosis of pancreatic cancer; it gave a negative result in 94% of patients without pancreatic cancer.

2300 LOCALIZATION OF GLUCAGONOMAS BY CATHETERIZATION OF THE PANCREATIC VEINS AND WITH GLUCAGON ASSAY. (Eng.) Ingemansson, S.; Holst, J.; Larsson, L. I.; Lunderquist, A. (Bispebjerg Hosp., Copenhagen, Denmark). *Surg. Gynecol. Obstet.* 145 (4):509-516; 1977.

Experiments were carried out in two patients with glucagonomas to determine whether glucagonomas could be detected preoperatively by determining differences in arteriovenous glucagon. Percutaneous transhepatic puncture of the portal vein and catheterization of the pancreatic veins were performed simultaneously with catheterization of the inferior vena cava and abdominal aorta. Blood samples obtained from the vena cava, aorta, and portal branches were assayed for glucagon, using an indirect immunohistochemical method. In both patients, significant arteriovenous glucagon differences allowed preoperative localization of the tumors; in the celiac artery, hepatic vein, and main portal vein, the decrease in glucagon levels from the preoperative to postoperative state was significant ($p<0.001$). A comparison with other localization techniques, such as scintiscan, ultrasound, arteriography, and pancreatic phlebography, showed the present method to be superior. Postoperatively, the same investigations were performed revealing arterial and venous glucagon levels comparable to the levels measured in a reference group of three patients without glucagonomas. The triple catheterization technique is advocated for all patients with clinical and laboratory findings that suggest pancreatic endocrine tumors.

2301 BILE SALT KINETICS IN CYSTIC FIBROSIS: INFLUENCE OF PANCREATIC ENZYME REPLACEMENT. (Eng.) Watkins, J. B.; Tercyak, A. M.; Szczepanik, P.; Klein, P. D. (Children's Hosp. Medical Center, 300 Longwood Ave., Boston, MA 02115). *Gastroenterology* 73(5):1023-1028; 1977.

Bile acid kinetics were investigated by a stable isotope-dilution technique in six children (ages 3.5 months to 4.5 yr) with previously untreated cystic fibrosis. All patients had malabsorption, normal intestinal mucosal function (as judged by glucose absorption), intestinal histology, disaccharidase levels, and normally functioning gallbladders. The children were maintained on a constant diet throughout the study period; fat intake averaged 4.2 g/kg/day. Before the administration of pancreatic enzyme replacement, fat excretion equalled 50 ± 4% of intake and was reduced to 20 ± 1.0% of intake after therapy. The total bile acid pool size nearly doubled during enzyme replacement from 379 ± 32 µmol/kg to 620 ± 36 µmol/kg with secondary bile acids comprising 57% of the total pool before therapy and 40% after therapy. Total bile acid synthesis changed little with therapy, equaling 139 ± 17 μmol/kg/day (total 602 ± 109 mg/day) without enzyme replacement and 125 ± 19 μmol/kg/day (total 470 ± 86 mg/day) with enzyme replacement. This result was confirmed by the fecal excretion of bile acids: 545 ± 166 mg of bile acid/day were excreted without enzymes as compared to 513 ± 146 mg/day with enzymes. After therapy, the fractional turnover rate of the bile acid pool was reduced from 0.602 ± 0.05/day to 0.233 ± 0.03/day for cholic acid and from 0.696 ± 0.09/day to 0.39 ± 0.04/day for chenodeoxycholic acid. These data indicate that both primary and secondary bile acids are conserved within the enterohepatic circulation during enzyme therapy, and that the mechanism for the regulation of hepatic bile acid synthesis is intact in cystic fibrosis. However, the demonstration that large amounts of bile acid continue to be excreted during therapy suggests that interruption of the enterohepatic circulation continues and that deficiencies of the intraluminal phase may persist during enzyme therapy in this disease.

2302 ABNORMAL BILIARY LIPID COMPOSITION IN CYSTIC FIBROSIS: EFFECT OF PANCREATIC ENZYMES. (Eng.) Roy, C. C.; Weber, A. M.; Morin, C. L.; Combes, J. C.; Nussle, D.; Megevand, A.; *et al.* (Hopital Ste. Justine, 3175 Ste. Catherine Rd., Montreal, Quebec H3T 1C5, Canada). *N. Engl. J. Med.* 297(24):1301-1305; 1977.

Because of the increased incidence of gallstones in cystic fibrosis, biliary lipid composition was compared in 26 patients with cystic fibrosis, 7 children with cholelithiasis but without cystic-fibrosis, and 13 controls. Eighteen of the cystic fibrosis patients had cholecystograms; only one had gallstones. In 14 patients with cystic fibrosis who had stopped taking pancreatic enzymes for 1 week, the mean molar percentage of lipid composition accounted for by cholesterol (16.3 ± 2.9%) and the saturation index (2.0 ± 0.3) were comparable to values of the cholelithiasis group and higher ($p<0.01$) than those of controls. In 12 patients with cystic fibrosis taking pancreatic enzymes, the mean molar percentage of cholesterol (8.6 ± 1.7%) and the saturation index (1.0 ± 0.1) did not differ from those of controls; in cystic fibrosis there was a preponderance of cholic over chenodeoxycholic acid both off (1.7 ± 0.2%) and on (1.9 ± 0.3%) therapy as compared to the cholelithiasis (0.7 ± 0.1%) and control (0.8 ± 0.0%) groups. The glycine/taurine ratio of conjugated bile acids was lower in enzyme-treated patients with cystic fibrosis (3.7 ± 0.6) than in patients off treatment (6.4 ± 1.0), but was higher ($p<0.01$) than in controls (1.8 ± 0.2). Bile is lithogenic in untreated cystic fibrosis patients, but responds to pancreatic enzymes.

2303 INFLUENCE OF LYOPHILIZED TOTAL PANCREAS ON PLASMA LIPIDS AND ON FAT ABSORPTION IN CYSTIC FIBROSIS. (Eng.) Malmendier, C. L.; Van den Bergen, C. J.; Baran, D. (St. Pierre Univ. Hosp., 322 Rue Haute, 1000 Brussels, Belgium). *Helv. Paediatr. Acta* 32(2):115-128; 1977.

The effects of a lyophilized pancreatic powder preparation on the plasma lipid concentration, on the fatty acid composition of neutral lipids (NL), triglycerides (TG), cholesteryl esters (CE), and phospholipids (PL), and on the coefficient of fat absorption were studied in 31 children with cystic fibrosis (CF) and pancreatic insufficiency and in 27 controls to evaluate the treatment. The children were subdivided into three groups according to their age, and lipids were studied before and after the treatment. The CF children had marked decreases in total lipids, cholesterol, TG, and PL content. Treatment with lyophilized pancreas normalized the mean values of PL but only slightly increased total cholesterol. Polyunsaturated fatty acids (PUFA) increased in NL, TG, and PL in normal children, whereas saturated (C16:0 and C18:0) and mono-unsaturated (C16:1 and C18:1) fatty acids increased in CF children; differences were more pronounced in NL and CE than in PL. The arachidonic/linoleic ratio was normal in CF children, suggesting no abnormality in desaturation of fatty acids at this step in metabolism. Treatment with total pancreas extract raised PUFA content (C18:2 and C20:4) in NL, CE, and TG in CF children. The mean fat absorption coefficient was 94.8 ± 1.5% in normal children as compared to 65 ± 7.6% in CF children ($p<0.001$). Treatment with lyophilized pancreas extract increased this coefficient in CF children to 82.5 ± 5.6% ($p<0.01$). In conclusion, treatment of CF patients with lyophilized pancreas normalized PL plasma concentration but corrected only to a limited degree cholesterol concentration and PUFA percentage. It is suggested that the significant correlation found between the fat absorption coefficient and PUFA percentage in NL of CF children may be used as an index of the stage of malabsorption.

2304 PANCREAS DIVISUM: ITS ASSOCIATION WITH PANCREATITIS. (Eng.) Gregg, J. A. (110 Francis St., Boston, MA 02215). *Am. J. Surg.* 134(5):539-543; 1977.

Experience with 33 patients with pancreas divisum studied by endoscopic retrograde cholangiopancreatography (ERCP) are described. Pancreatitis was present in 15 patients, and another 11 had recurrent episodes of pain typical of pancreatitis. The major papilla was cannulated in all patients, but the duct of Wirsung was opacified in only 28 and showed changes of pancreatitis in 1. Attempts were made to cannulate the minor papilla in 15 of the 33 patients and were successful in 4. The duct of Santorini showed typical changes of pancreatitis in one case. One patient had pancreatic cancer, and the duct of Wirsung demonstrated only nonspecific abnormalities. In only two cases was pancreatitis due to alcohol abuse. The high incidence of pancreatitis and pancreatic-like pain in patients with pancreas divisum may be due to the very small ampulla of the duct of Santorini, which in these patients drains the majority of the pancreas, creating a marked relative stenosis of the ampulla. Surgery for relief of pain was required in five patients. The operation of choice, when pancreatitis involves the dorsal pancreas, appears to be distal resection with drainage.

2305 COMPARATIVE EFFECTS OF ANTACIDS, CIMETIDINE AND ENTERIC COATING ON THE THERAPEUTIC RESPONSE TO ORAL ENZYMES IN SEVERE PANCREATIC INSUFFICIENCY. (Eng.) Regan, P. T.; Malagelada, J. R.; DiMagno, E. P.; Glanzman, S. L.; Go, V. L. W. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *N. Engl. J. Med.* 297(16):854-858; 1977.

The effects of various treatments on fecal fat and nitrogen balance and on duodenal recovery of ingested pancreatic enzymes were evaluated in six patients with advanced pancreatic insufficiency to provide a rational basis for pancreatic enzyme replacement therapy after a solid test meal. The combination of cimetidine and pancreatin (300 mg and 2.5 g, resp., p.o.) produced significantly higher postprandial duodenal recoveries and concentrations of trypsin and lipase ($p<0.05$). Steatorrhea was reduced in all patients and abolished in four of the six. In the dosages used, neither enteric-coated enzymes nor supplemental neutralizing antacids were more effective than pancreatin alone in decreasing steatorrhea or improving duodenal enzyme delivery. Cimetidine may be a useful adjunct to p.o. pancreatic extract therapy in some patients with severe pancreatic insufficiency who fail to respond to pancreatic enzyme replacement alone. No side-effects attributable to cimetidine were noted.

2306 REGIONAL PANCREATECTOMY: EN BLOC PANCREATIC, PORTAL VEIN AND LYMPH NODE RESECTION. (Eng.) Fortner, J. G.; Kim, D. K.; Cubilla, A.; Turnbull, A.; Pahnke, L. D.; Shils, M. E. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *Ann. Surg.* 186(1):42-50; 1977.

Experience with 18 patients who had a regional pancreatectomy is presented. The pancreatic segment of portal vein was excised with the en bloc total pancreatectomy and regional lymph node dissection in all patients. Venous repair was by end-to-end anastomosis without a graft. Five patients also had various arterial resections and reconstructions. Sixteen of the 18 had been explored and deemed nonresectable in other institutions. This operation has doubled the resectability rate in the authors' institution. The 30-day operative mortality rate was 16.6%. Actuarial survival is 62% at 1 yr compared with a 36% 1-yr survival rate for patients undergoing pancreaticoduodenectomy for less advanced cancer in previous years. A more valid comparison would be between those who had a palliative procedure, since most patients in the present series were initially considered unresectable. One-year survival for these patients was 22%. The quality of life was good for most patients.

2307 ANALYSIS OF PANCREATIC FUNCTION THROUGH FECAL CHYMOTRYPSIN DETERMINATION AND SECRETIN-PANCREOZYMIN TEST: A COMPARATIVE STUDY. (Ger.) Tympner, F.; Reiner, T.; Domschke, W. (Med. Univ.-Klinik, Krankenhausstrasse 12, 852 Erlangen, W. Germany). *Fortschr. Med.* 95(27): 1711-1714; 1977.

2308 DIAGNOSIS OF PANCREATIC TUMORS USING TWO-INDICATOR SCANNOGRAPHY. (Rus.) Vinogradov, V. A.; Itin, A. B. (Oncological Science Center, Acad. Medical Science USSR, Moscow, USSR). *Med. Radiol. (Mosk.)* 22(8):25-30; 1977.

2309 CYSTADENOMA ON HETEROTOPIC PANCREATIC TISSUE: PRESENTING AS A CHRONIC ANEMIA. (Fre.) Kaswin, R.; Nouel, O.; Leclerc, J. P.; Sobotka, F.; Celerier, M.; Modigliani, R. (Hopital Fernand-Widal, 200, rue du Faubourg-Saint-Denis, F 75010 Paris, France). *Gastroenterol. Clin. Biol.* 1(5):461-466; 1977.

2310 FUNCTIONAL AND MORPHOLOGIC STUDIES OF THE EFFECT OF ALCOHOL ON THE PANCREATIC PARENCHYMA. (Eng.) Bordalo, O.; Noronha, M.; Dreiling, D. A. (Faculty Medicine of Lisbon, Lisbon, Portugal). *Mt. Sinai J. Med.* 44(4):481-484; 1977.

See also, 1865, 2001, 2002, 2003, 2015, 2016, 2017, 2019, 2020, 2021, 2023, 2039, 2047, 2232, 2318, 2356, 2441, 2462, 2496, 2591, 2592.

PANCREAS

Pancreatitis

2311 MECHANISM AND SPECIFICITY OF INCREASED AMYLASE/CREATININE CLEARANCE RATIO IN PANCREATITIS. (Eng.) Marten, A.; Beales, D.; Elias, E. (Royal Free Hosp., London, England). *Gut* 18(9):703-708; 1977.

The amylase/creatinine clearance ratio (Cam/Ccr ratio) was determined in 89 controls, 13 patients with acute pancreatitis, 18 patients with choledocholithiasis, 14 diabetics, 19 alcoholics with liver disease, 30 patients with chronic pancreatitis, 3 patients with peptic ulcer, 12 patients with primary biliary cirrhosis, 13 patients with pancreatic carcinoma, and 30 patients with chronic renal failure to test the specificity of the Cam/Ccr ratio and to observe the relationship of plasma glucagon to renal amylase clearance. In the 87 hospitalized control patients without pancreatic disease, the Cam/Ccr ratio was 3.02 ± 0.69. The ratio was above the normal range in all patients with acute pancreatitis but was normal in those with chronic pancreatitis and carcinoma of the pancreas. In 18 patients with cholelithiasis, an increased ratio distinguished those with pancreatitis, as assessed independently during laparotomy, from those with a macroscopically normal pancreas. Raised Cam/Ccr ratios were also found in diabetics with ketoacidosis and in three patients with fulminant alcoholic liver disease. Although a positive correlation was found between the Cam/Ccr ratio and serum creatinine concentration, abnormally high ratios did not occur in the 30 patients with chronic renal failure. A significant increase in Cam/Ccr ratios was produced in six healthy volunteers by the i.v. injection of glucagon. However, it is unlikely that hyperglucagonemia alone accounts for the increased Cam/Ccr ratio seen in acute pancreatitis, as no correlation was found between the clearance ratio and the plasma glucagon concentration in a series of patients. In two other patients in whom excess circulating pancreatic polypeptide was detected, the Cam/Ccr ratio was normal. It is concluded that, in view of the sensitivity and relative specificity of finding an increased Cam/Ccr ratio in acute pancreatitis, its determination should be valuable clinically, especially in those cases of hyperamylasemia where the cause is in doubt. It is unlikely that either glucagon or pancreatic polypeptide is a major factor in the production of the increased Cam/Ccr ratio.

2312 AMYLASE/CREATININE CLEARANCE RATIO (C_{Am}/C_{Cr}) AND RENAL TUBULAR FUNCTION IN ACUTE PANCREATITIS (AP): LACK OF SPECIFICITY [Abstract]. (Eng.) Lankisch, P. G.; Wolfrum, D. I.; Koop, H.; Winckler, K. (Dept. Medicine, Univ. Gottingen, Gottingen, W. Germany). *Ir. J. Med. Sci.* 146(Suppl. 1):28; 1977.

2313 CRITICAL ANALYSIS OF SURGICAL RESULTS IN CHRONIC PANCREATITIS (CP) [Abstract]. (Eng.) Ammann, R. (Univ. Hosp., CH-8091 Zurich, Switzerland). *Ir. J. Med. Sci.* 146(Suppl. 1):18; 1977.

2314 HYPERLIPAEMIA IN PANCREATITIS [Abstract]. (Eng.) Schmidt, A.; Buch, J.; Buch, A. (Kommunehospitalet, 1399 Copenhagen K, Denmark). *Ir. J. Med. Sci.* 146(Suppl. 1):2; 1977.

2315 CHRONIC PANCREATITIS IN ITALY: AETIOLOGICAL FACTORS [Abstract]. (Eng.) Gullo, L. (Dept. Medicine, Bologna, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):1-2; 1977.

2316 THE SERUM COMPLEMENT SYSTEM AS AN INITIATOR AND PROGNOSTIC CLUE IN ACUTE PANCREATITIS [Abstract]. (Eng.) Seelig, R.; Lankisch, P. G.; Koop, H.; Kaboth, U.; Winckler, K.; Seelig, H. P. (Inst. Immunology, Univ. Heidelberg, Heidelberg, W. Germany). *Ir. J. Med. Sci.* 146 (Suppl. 1):1; 1977.

2317 DRUGS AS ASSOCIATED FACTORS IN PRIMARY ACUTE PANCREATITIS [Abstract]. (Eng.) Bourke, J. B.; McIllmurray, M. B.; Mead, G. M.; Langman, M. J. S. (City Hosp., Nottingham, England). *Ir. J. Med. Sci.* 146(Suppl. 1):1; 1977.

2318 THE USE OF PAROTID SECRETION IN SCREENING FOR CHRONIC PANCREATITIS [Abstract]. (Eng.) Noronha, M.; Dreiling, D.; Bordalo, O. (Faculty Medicine, Univ. Lisbon, Lisbon, Portugal). *Ir. J. Med. Sci.* 146(Suppl. 1): 14; 1977.

2319 THE STUDY OF PAROTID AND MIXED SALIVA IN THE DIAGNOSIS OF CHRONIC PANCREATITIS [Abstract]. (Eng.) Dobrilla, G.; Valentini, M.; Filippini, M.; Bonoldi, M. C.; Felder, M.; Moroder, E. (Ospedale Regionale I, 39100, Bolzano, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):13; 1977.

2320 IMPAIRED RELEASE OF PANCREATIC POLYPEPTIDE IN PATIENTS WITH CHRONIC PANCREATITIS [Abstract]. (Eng.) Hacki, W. H.; Kayasseh, L.; Gyr, K. (Medical Faculty, Univ. Berne, Berne, Switzerland). *Ir. J. Med. Sci.* 146(Suppl. 1):12-13; 1977.

2321 AN EVALUATION OF THE LUNDH-BORGSTROM TEST AND THE SECRETIN-PANCREOZYMIN TEST IN THE DIAGNOSIS OF CHRONIC PANCREATITIS [Abstract]. (Eng.) Braganza, J. M.; Rao, J. J. (Royal Infirmary, Manchester, England). *Ir. J. Med. Sci.* 146(Suppl. 1):12; 1977.

2322 MALABSORPTION IN CHRONIC PANCREATITIS [Abstract]. (Eng.) Wakasugi, H. (Faculty Medicine, Kyushu Univ., Fukuoka, Japan). *Gastroenterol. Jpn.* 12(4):324; 1977.

2323 INCIDENCE AND MORTALITY OF ACUTE PANCREATITIS [Letter to Editor]. (Eng.) Bourke, J. B. (Dept. Surgery, Univ. Nottingham,

ottingham, England). *Br. Med. J.* 2(6103):1668-669; 1977.

324 CHRONIC ALCOHOLIC PANCREATITIS; PATHOGENESIS AND CLINICAL FEATURES INCLUDING ROSPECTIVE STUDIES OF CHRONIC ALCOHOLICS [Abtract]. (Eng.) Homma, T. (Dept. Medicine, hinshu Univ., Asahimachi, Matsumoto, Japan). *astroenterol. Jpn.* 12(4):341; 1977.

2325 PATHOGENESIS AND PROGNOSIS OF ALCOHOLIC CHRONIC PANCREATITIS [Abstract]. (Eng.) Saitoh, Y. (Tohoku Univ. Sch. Medicine, Sendai, Japan). *Gastroenterol. Jpn.* 12(4):341-342; 1977.

See also, 2001, 2002, 2015, 2018, 2039, 2119, 2304, 2492, 2514, 2541, 2607.

LIVER AND BILIARY TRACT

2326 MICROCALORIMETRIC MEASUREMENTS OF HEAT PRODUCTION IN ERYTHROCYTES OF PATIENTS WITH LIVER DISEASES. (Eng.) Monti, M. (Univ. Hosp., S-221 85 Lund, Sweden). *Scand. J. Haematol.* 19(3):313-318; 1977.

RBC metabolic activity was investigated in 12 patients with severe liver disease. Measurements of RBC heat production and glucose consumption were made *in vitro* with and without stimulation of the pentose phosphate pathway with methylene blue. The RBC resting heat effect value was 25% higher than normal ($p<0.005$). A normal value was obtained when heat effect was measured under maximal stimulation with 10^{-4} M methylene blue. Glucose consumption was normal, both in unstimulated and methylene blue-stimulated RBC. The results do not support the hypothesis that hemolytic anemia in patients with liver disease is related to decreased activity of the pentose phosphate pathway.

2327 DIFFUSE INTRAVASCULAR COAGULATION IN LIVER DISEASE? (Eng.) Straub, P. W. (Inselspital, Berne, Switzerland). *Semin. Thromb. Hemostas.* 4(1):29-39; 1977.

Arguments for the role of diffuse intravascular coagulation (DIC) in liver diseases are critically reviewed. The following signs of DIC are discussed: the presence of microthrombi, hypofibrinogenemia and decreases in factors V and VIII, thrombocytopenia, the accelerated disappearance of plasma fibrinogen, increases in circulating FDP, the presence of fibrinogen-fibrin complexes, and the reversal of laboratory abnormalities after heparin therapy. In general, although some degree of activation of coagulation is probably present in a condition associated with tissue necrosis, the role that it plays in the hemostatic failure of patients with liver diseases appears to be far from established. In the presence of decreased fibrinogen synthesis, even discrete DIC could result in impressive finding, apt to be misinterpreted in their significance. Findings compatible with a diagnosis of DIC, and subject to the same criticism, have also reported various severe acute liver diseases other than cirrhosis. Therapy is discussed with reference to the current knowledge concerning the pathophysiology of the coagulation defect in liver diseases.

2328 COAGULATION ABNORMALITIES IN LIVER DISEASE. (Eng.) Lechner, K.; Niessner, H.; Thaler, E. (First Dept. Medicine, Univ. Vienna, Vienna, Austria). *Semin. Thromb. Hemostas.* 4(1):40-56; 1977.

Recent data relating to coagulation abnormalities in liver disease are summarized; pathogenetic factors responsible for these abnormalities are discussed; and the role of functional and immunologic clotting tests for the evaluation of liver function and the differential diagnosis and prognosis of liver disease is defined. In the majority of patients with liver disease, the blood levels of the vitamin K-dependent clotting factors (factors II, VII, IX, and X) are reduced primarily because of the decreased capacity of the liver to synthesize proteins. The activity of antithrombin III is also decreased in patients with acute and chronic liver disease, and a prolonged thrombin time is often observed. The degree of reduction of clotting factors II, V, VII, and X, and of antithrombin III correlates fairly well with the extent of liver damage and can be used as a guide to prognosis, provided that other mechanisms that may influence the blood levels are carefully considered. Clotting factor assays have only a limited value for the differential diagnosis of liver disease, however. Specific blood coagulation changes in the following liver diseases are discussed: acute liver disease, liver cirrhosis, chronic hepatitis, biliary cirrhosis and obstructive jaundice, Dubin-Johnson syndrome, Gilbert syndrome, primary hepatocellular carcinoma, and metastatic cancer of the liver.

2329 THE LIVER IN SARCOIDOSIS. (Eng.) Lehmuskallio, E.; Hannuksela, M.; Halme, H. (Univ. Central Hosp., Helsinki, Finland). *Acta Med. Scand.* 202(4):289-293; 1977.

The results of liver function tests were studied in 325 Finnish patients with sarcoidosis and in 132 patients with nonsarcoid erythema nodosum, and needle biopsy specimens of the liver were examined in 121 sarcoidosis patients. Granulomas compatible with sarcoidosis were seen in 24% of the 121 biopsied cases. Liver function tests (serum alkaline phosphatase, serum alanine aminotransferase, serum aspartate aminotransferase, and BSP clearance test) were abnormal, especially in patients with extensive erythema nodosum, but there was no correlation with the disease responsible for the eruption. Serum alanine aminotransferase was markedly increased in 3 of 61 cases examined; all of these patients had erythema nodosum. Among 310 cases examined, 1.3% had high alkaline phosphatase levels, all of whom had sarcoidosis. BSP excretion was abnormal in 8% of the patients examined. Hepatic granulomas were found more often in patients with sarcoid changes in the lung parenchyma than in those with bilateral hilar adenitis only (14/46 cases versus 10/64 cases). There were no other definite correlations between hepatic granulomas and other clinical and laboratory findings. The incidence of pathological results in this study was clearly lower than that in the United States, thus reflecting a good prognosis of sarcoidosis in the Scandinavian countries.

2330 CHRONIC LIVER DYSFUNCTION IN MULTITRANSFUSED HEMOPHILIACS. (Eng.) Hasiba, U. W.; Spero, J. A.; Lewis, J. H. (Central Blood Bank Pittsburgh, 812 Fifth Ave., Pittsburgh, PA 15219). *Transfusion* 17(5):490-494; 1977.

The potential adverse effects of long-term exposure to multiple lots of pooled fractions was evaluated by determining SGPT and SGOT levels and serum hepatitis B surface antigen (HBsAg) and antibody to HBsAg (anti-HBs) during a 3-yr period in 118 patients with factor VIII or factor IX deficiency. The 107 HBsAg-negative patients were divided into four groups according to their mode of therapy. Persistently abnormal transaminase values were present in 51% of patients with a large exposure to factor VIII concentrates, in 43% with a small factor VIII exposure, and in 37% exposed to prothrombin complexes. This was contrasted with abnormalities in 8% of patients treated only with cryoprecipitate. The incidence and degree of serum transaminase abnormality appeared to be independent of a past history of jaundice. All patients without persistent antigenemia who had been treated with pooled plasma products showed antibodies to HBsAg. High titer anti-HBs prior to initial fraction therapy appeared to be protective against jaundice. The 11 patients with persistent antigenemia had significantly higher transaminase levels than the HBsAg-negative group.

2331 LIVER DYSFUNCTION IN PATIENTS WITH HEMOPHILIA A, B, AND VON WILLEBRAND'S DISEASE. (Eng.) Hilgartner, M. W.; Giardina, P. (Cornell Univ. Medical Coll.-New York Hosp., 525 E. 68th St., New York, NY 10021). *Transfusion* 17(5):495-499; 1977.

The incidence of liver disease was determined in 95 patients with hemophilia A or B, or von Willebrand's disease, who were followed over a 3-yr period. Half the patients were treated episodically, and half received additional prophylactic treatment. Fifty-five per cent had significantly elevated SGOT and SGPT levels, and had biochemical evidence of chronic active liver disease. Two percent had subacute and active cirrhosis. There was an annual attack rate of hepatitis B of 3.5%, and hepatitis B antibody titers were present in 84%. Asymptomatic liver disease in patients with hemophilia requires close monitoring to determine the clinical significance.

2332 CONTRACEPTIVE STEROIDS AND LIVER LESIONS. (Eng.) Garcia, C. R.; Gordon, J.; Drill, V. A. (Univ. Pennsylvania Hosp., Philadelphia, PA 19104). *J. Toxicol. Environ. Health* 3(1/2):197-206; 1977.

Factors concerning the possible untoward effect of oral contraceptives on the liver are reviewed. During the past 10 yr, an increasing number of cases of hepatic adenomas and related lesions has been reported in women using these contraceptives. Such lesions occur only rarely, but it is the rarity itself that makes it difficult to evaluate the role of the contraceptive steroids. The enormity of the denominator in contraceptive steroid usage is so unwieldy that mechanisms to measure accurately the difference in an extremely small numerator are still plaguing the epidemiologist, who at best can supply only estimates. Oral contraceptives do not significantly alter liver function tests in experimental animals, although women receiving the steroids may show a small degree of BSP retention similar to that occurring during pregnancy. Benign cholestatic jaundice may occur in patients taking the pill, although it is now recognized that this jaundice is similar to the benign cholestatic jaundice of pregnancy and that it occurs primarily in women with a history of the latter.

2333 SYSTEMIC AND REGIONAL TREATMENT OF PRIMARY CARCINOMA OF THE LIVER. (Eng.) Lee, Y. T. N. (Univ. Southern California Medical Center, Los Angeles, CA 90033). *Cancer Treat. Rev.* 4(3):195-212; 1977.

Therapy for primary hepatic carcinoma is reviewed, with particular emphasis on the results of each type of therapy. The median survival after diagnosis for symptomatically treated patients is less han 4 months. Surgical resection is the treatment f choice. The reported resectability rate was -30%, and the operative mortality rate 12.5-34%. lthough the majority of cases die with recurrent isease, patients whose lesion can be resected ave the highest 5-yr survival rate (10-15%). Radioherapy has been shown to be of limited benefit or primary carcinoma of the liver. Although chemoherapy in the past produced a low response rate nd did not prolong survival times, in a recent tudy, 7 of 19 patients had objective response to ombinations of 5-fluorouracil (5-FU) and bischlorothyl-nitrosourea (BCNU), and 3 patients were in omplete remission for 3, 4 and 6 yr, resp. In nother study, all 11 patients responded to adriaycin (median survival=8 months), with 3 exhibiting omplete tumor regression and surviving 8, 9, and 3 months, resp. Several reports showed that the ntra-arterial infusion of chemotherapeutic agents 5-FU, fluorodeoxyuridine, methotrexate, and mitoycin) can cause response in 50-75% of the cases, nd prolong survival over untreated patients or atients receiving other routes of chemotherapy. eliberate ligation of the hepatic artery has been sed as treatment of primary tumors of the liver. xcluding patients with cirrhosis, massive involveent of the liver, and far-advanced hepatic decomensation, the overall operative mortality associated with hepatic artery ligation is about 19%, ith 4% directly attributable to ligation of the rtery. Several investigators have administered hemotherapeutic agents either to branches of the ortal vein or to the distal hepatic artery to revent tumor regrowth. However, there is no definite evidence that hepatic artery ligation, with r without added infusion chemotherapy to the iver, gives better response and/or survival results than infusion chemotherapy to the hepatic rtery alone. Other therapeutic approaches such s infusion chemotherapy via the portal vein, ligation of portal vein branches, and liver translantation have not shown definite benefit. On he other hand, two cases of spontaneous regression f hepatoma and three cases of documented cure fter 5-FU or 5-FU-BCNU combination chemotherapy have een reported. For nonresectable lesions of heatic carcinoma, regional and systemic chemotheraeutic treatment is available. With the availaility of adriamycin and newer combinations of ffective agents, the outlook for such patients ay be greatly improved.

2334 GRANULOMATOUS LIVER DISEASE AND GIANT CELL ARTERITIS. CASE REPORT AND LITERAURE REVIEW. (Eng.) Litwack, K. D.; Bohan, A.; ilverman, L. (Hoag Memorial Hosp., Newport Beach, A 92663). *J. Rheumatol.* 4(3):307-312; 1977.

he case of a 64-yr-old woman with granulomatous iver disease associated with the polymyalgia heumatica-giant cell arteritis syndrome is preented. Treatment with prednisone (45 mg/day) reulted in prompt improvement in both the polymyalgia heumatica-giant cell arteritis syndrome, as well s the tests of liver function. Polymyalgia rheuatica and giant cell arteritis may involve the liver and should be included in the differential diagnosis of granulomatous liver disease.

2335 SERUM, CEREBROSPINAL FLUID, AND BRAIN LEVELS OF BILE ACIDS IN PATIENTS WITH FULMINANT HEPATIC FAILURE. (Eng.) Bron, B.; Waldram, R.; Silk, D. B. A.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, England). *Gut* 18(9):692-696; 1977.

To investigate whether the known toxic effects of bile salts are involved in the pathogenesis of cerebral edema in fulminant hepatic failure (FHF), bile acid levels were measured in the sera, cerebrospinal fluid (CSF), and brain tissue of 10 patients immediately after death from FHF. Serum bile acids in FHF were predominantly conjugated, and total bile acid levels were higher in all 10 patients than in normal controls (85.9 ± 8.4 compared with 5.7 ± 0.4 nmol/ml, $p<0.001$). Small but significant amounts of bile acids were detected in CSF (range 1.2-5.3 nmol total bile acid/ml) and brain biopsies (1.0-18.8 nmol/g wet weight) of FHF patients, whereas none could be detected in CSF and brain biopsies of patients dying without evidence of liver disease. There was no relationship between serum, CSF, or brain levels of bile acids and duration of coma, or presence of cerebral edema found in five FHF patients at necropsy. However, serum bile acid levels were similar in FHF to those found in chronic liver disease without encephalopathy and lower than those found to inhibit brain respiration *in vitro*. A primary role for these compounds in the pathogenesis of coma in FHF therefore seems unlikely.

2336 RECURRENT HEMATOBILIA AFTER PERCUTANEOUS LIVER BIOPSY. (Ger.) Fengler, J. D.; Baumgarten, R. (Infektionsklinik des Stadtischen Krankenhauses Berlin-Prenzlauer Berg, Nordmarkstr., 15, DDR-1055 Berlin, E. Germany). *Dtsch. Gesundheitsw.* 32(5):213-215; 1977.

2337 REPORT OF A CASE OF WILSON'S DISEASE: HEMODYNAMIC ASPECTS. (Ita.) Sacco, R.; Bianco, A.; Cagossi, M. (Istituto di Clinica Chirurgica Generale e Terapia Chirurgica, Universita Cattolica del Sacro Cuore, Rome, Italy). *Chir. Patol. Sper.* 24(3):190-195; 1976.

2338 DIAGNOSIS OF FOCAL LESIONS OF THE LIVER. (Rus.) Izimbergenov, N. I.; Upyrev, A. V. (Second Dept. Surgery, Central Inst. Advanced Medical Studies, Moscow, USSR). *Vestn. Khir.* 117 (7):30-34; 1976.

2339 SCINTIGRAPHY IN LIVER CANCER. (Spa.) Rey, C.; Escribano, J. C.; Garnacho, A.; Foz, M.; Ortega, D. (Ciudad Sanitaria de la Seguridad Social "Francisco Franco," Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(1):37-46; 1977.

2340 MAIN PRINCIPLES OF IMMUNODEPRESSIVE TREATMENT OF CHRONIC LIVER DISEASES. (Rus.) Podymova, S. D. (Dept. Therapy, I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Vrach. Delo* (8):15-19; 1976.

2341 HEPATOTROPIC THERAPY OF HOSPITALIZED ELDERLY PATIENTS. (Ita.) Bandinelli, C. (Ospedale Generale Regionale "S. Maria della Scalla," Via Gorizia, 33, 53100 Siena, Italy). *Clin. Ter.* 78(5):471-479; 1976.

2342 CLINICAL EXPERIENCE WITH THE ORAL HEPATIC DRUG HEPAVIS. (Ger.) Bayazid, A.; Gerhard, W. (St. Vinzenz-Krankenhaus, Eintrachtstrasse 129-147, 5000 Koln 1, W. Germany). *Med. Welt* 27(46):2248-2249; 1976.

2343 DIETETIC TREATMENT OF PATIENTS WITH PORTACAVAL ANASTOMOSIS. (Ger.) Vetter, K.; Hirte, C. (Forschungsklinik des Zentralinstituts fur Ernahrung, Akademie der Wissenschaften der DDR, Arthur-Scheunert-Allee 155, DDR-1505 Rehbrucke, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4): 177-179; 1976.

2344 LIVER DISEASES IN THE LIGHT OF LABORATORY FINDINGS. (Ger.) Rosler-Englhardt, A. (Rudolf-Virchow-Krankenhaus Berlin, Augustenburger Platz 1, D-1000 Berlin 65, W. Germany). *Med. Klin.* 71(36):1413-1421; 1976.

2345 INVESTIGATIONS ON SURFACE AND NUCLEAR ANTIGEN IN LIVER BIOPSY SPECIMENS. (Ger.) Maleev, A.; Kolarski, W.; Ognjanov, M.; Baleva, M.; Lossev, B.; Teocharova, M. (Medical Clinic, Bulgarian Acad. Medicine, ul. Georgi Sofiiski 1, Sofia 31, Bulgaria). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):123-125; 1976.

2346 BUDD-CHIARI SYNDROME IN TWELVE CHILDREN IN SAO PAULO. (Por.) Borges, M. A. G.; Procianoy, R. S.; Saldanha, L. B.; Oselka, G. W.; Carneiro, M. M. S.; Kiss, M. H. B. (Hospital das Clinicas da Faculdade de Medicina da Universidade de Sao Paulo, Sao Paulo, Brazil). *Arq. Gastroenterol.* 14(1):41-44; 1977.

2347 TUMORS OF THE LIVER--LAPAROSCOPIC ASPECTS. (Ger.) Morl, M. (Stoffwechselklinik der LVA Wurttemberg, 699 Bad Mergentheim, Wurttemberg, W. Germany). *Fortschr. Med.* 94(32):1876-1878; 1976.

2348 THE DIAGNOSIS OF HEPATIC METASTASES. (Ger.) Weber, V.; Gruenagel, H. H.; Domres, B.; Hoppe, U. (Klinik fur Allgemeinchirurgie der Medizinischen Hochschule Hannover, Podbielskistr. 380, D-3000 Hannover 51, W. Germany). *Zentralbl. Chir.* 102(6):367-370; 1977.

2349 DIABETIC ENCEPHALOPATHIES. (Fre.) Degos
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2361 ARTERIAL LIGATURE AS AN ALTERNATIVE TO PARTIAL RESECTION IN LIVER TRAUMA. (Ger.) Ruedi, Th. (Kantonsspital, CH-4031 Basel, Switzerland). *Helv. Chir. Acta* 44(3):97-98; 1977.

2362 RESECTION OF THE LIVER ACCORDING TO TON-THAT-TUNG. (Cze.) Mayer, F. (Chirurgicke oddeleni NsP, Turnov, Czechoslovakia). *Rozhl. Chir.* 55(6):423-431; 1976.

See also, 1879, 2004, 2005, 2006, 2007, 2008, 2027, 2029, 2162, 2212, 2219, 2220, 2232, 2372, 2391, 2419, 2432, 2465, 2526, 2530, 2538, 2541, 2548, 2588, 2589, 2590, 2608, 2615, 2616, 2620.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

2363 UNCONJUGATED HYPERBILIRUBINEMIA AND CHRONIC PERSISTENT HEPATITIS [Abstract]. (Eng.) Felsher, B.; Carpio, N. (Veterans Admin. Hosp., Long Beach, CA). *Clin. Res.* 26(2):150A; 1978.

2364 SISTER CHROMATID EXCHANGE IN BABIES TREATED BY PHOTOTHERAPY [Letter to Editor]. (Eng.) Goyanes-Villaescusa, V. J.; Ugarte, M.; Vazquez, A. (Juan Canalejo Hosp., La Coruna, Spain). *Lancet* 2(8047):1084-1085; 1977.

See also, 2539.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

2365 GRANULOMATOUS HEPATITIS. (Pol.) Kozakiewicz, H.; Stolarczyk, J.; Ellert-Zygadlowska, J.; Zielinska, W.; Jasiel, M. (Klinika Chorob Zakaznych Instytutu Chorob Wewnetrznych AM, ul. Smoluchowskiego 18, 80-214 Gdansk-Wrzeszcz, Poland). *Pol. Tyg. Lek.* 32(17):647-649; 1977.

Granulomatous hepatitis (GH) is a disease with chronic and hidden course, with various intensities of clinical symptoms and morphological changes, mainly in the form of granulomas situated in liver lobules and portal spaces. Most frequently, GH is caused by such chronic infections as tuberculosis, brucellosis, tularemia, Q fever, syphilis, deep mycosis, and also by sarcoidosis and Hodgkin's disease. Intensity of nodular infiltrations in tuberculosis depends on the kind, localization, and intensity of the disease. Similar granulomatous changes are observed in active brucellosis, especially caused by *Brucella abortus bovis*. Nodular infiltrations of the liver with a tendency to necrosis and caseation appear during the acute period of tularemia. Hepatosplenomegaly and hepatic malfunction in Q fever are also accompanied by granulomatous infiltrations. Similar changes occur in mononucleosis and mycosis, and especially in actinomycosis, when macroscopic nodules and abscesses may occur in the liver. GH is very often caused by sarcoidosis in which granulomatous infiltrations in liver are found in 60% of the cases. Polymorphic infiltrations occur in 70% of the cases in Hodgkin's disease. GH can be also caused by several chemical and pharmacological agents. It was observed in berylliosis, silicoidosis, poisoning by copper-containing pesticides, drug hypersensitivity, and in some autoimmune diseases. It is not known whether liver granulomas are caused by action of exogenous agents or autoimmunization. Even though clinical symptoms of GH are different and nonspecific, detailed studies based on biopsies should clarify the mechanism of reaction of liver tissue to the pathogenic agents.

2366 CHANGES OF THE MITOTIC ACTIVITY OF HEPATOCYTES AND RESORPTION OF NECROTIC AREAS IN THE FORMATION OF LIVER CIRRHOSIS. (Rus.) Petrovichev, N. N. (I. P. Pavlov First Leningrad Medical Inst., Leningrad, USSR). *Biull. Eksp. Biol. Med.* 81(5):617-618; 1976.

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2368 FATAL CARBAMAZEPINE HEPATITIS. (Eng.) Zucker, P.; Daum, F.; Cohen, M. I. (Montefiore Hosp. and Medical Center, 111 East 210 St., Bronx, NY 10467). *J. Pediatr.* 91(4):667-668; 1977.

2369 PRONESTYL INDUCED GRANULOMATOUS HEPATITIS [Abstract]. (Eng.) Espiritu, C. R.; Alalu, J. V.; Lubin, J. (Mount Sinai Medical Center, Miami Beach, FL). *Gastroenterology* 73(5): 1219; 1977.

2370 DRUG-INDUCED FULMINANT HEPATITIS [Abstract]. (Eng.) Yamaguchi, K.; Namihisa, T. (Juntendo Univ. Sch. Medicine, Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):328-329; 1977.

2371 FOLLOW-UP OF HALOTHANE HEPATITIS: BENIGN RESOLUTION OF A SEVERE LESION [Abstract]. (Eng.) Miller, D. J.; Klatskin, G. (Dept. Medicine, Yale Univ., New Haven, CT). *Gastroenterology* 73(5):1234; 1977.

See also, 1913, 1918, 2327, 2344.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

2372 HBsAg, CHRONIC LYMPHOPROLIFERATIVE DISORDERS, AND CIRRHOSIS OF LIVER. (Eng.) Heimann, R.; Ray, M. B.; Desmet, V. J. (Dept. Pathology, Institut Jules Bordet, Univ. Brussels, B. 1000 Brussels, Belgium). *J. Clin. Pathol.* 30(9): 817-821; 1977.

The incidence of hepatitis B surface antigen (HBsAg) was studied in 23 necropsy cases of chronic lymphoproliferative disorders to clarify the previously reported high incidence of cirrhosis in such disorders. The type of lymphoma was reviewed in the light of the new functional classifications of non-Hodgkin malignant lymphomas introduced by Lennert and Lukes. The presence of HBsAg in the liver was investigated by the indirect immunofluorescence technique. Eleven cases showed plasmocytoid features and were considered to be immunocytomas. Seven cases showed liver cirrhosis; six of them belonged to the immunocytoma group. Four cases were HBsAg-positive. Three of them were found among the group combining cirrhosis and immunocytoma. They presented the abundant nodular distribution of HBsAg typical of inactive cirrhosis. A parallel is drawn between the often reported association of Waldenstrom's syndrome and cirrhosis and the association of immunocytoma and cirrhosis observed in this study. The analogy is further justified since most of the lymphomas associated with Waldenstrom's syndrome happen to be immunocytomas. Therefore the association between hepatitis B virus infection and cirrhosis on the one hand and chronic lymphoproliferative disorders on the other may not be purely coincidental. A chronic antigenic stimulus such as persisting HBsAg could trigger the proliferation of a malignant lymphoid clone.

2373 LIVER RHEOGRAPHY IN CHILDREN WITH VIRAL HEPATITIS. (Rus.) Butenko, O. F. (Hosp. No. 1 of Infectious Diseases, Zaporozh'e, USSR). *Pediatriia* (7):28-29; 1976.

2374 INFLUENCE OF VARIOUS THERAPEUTIC METHODS ON THE FUNCTIONAL STATUS OF THE KIDNEYS IN CHILDREN WITH VIRAL HEPATITIS. (Ukr.) Kadirov, B. A. (Second Dept. Childhood Infections, Central Asiatic Inst. Pediatric Medicine, USSR). *Pediatr. Akush. Ginekol.* (6):17; 1976.

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2377 INFLUENCE OF COMPLEX THERAPY WITH POTASSIUM OROTATE ON THE UNSPECIFIC IMMUNE REACTIVITY IN CHILDREN WITH VIRAL HEPATITIS. (Ukr.) Bogatir'ova, S. O. (Dept. Childhood Infections, Kiev Medical Inst., Kiev, USSR). *Pediatr. Akush. Ginekol.* (6):15-17; 1976.

2378 HYDROPHILIA OF TISSUES AND EXTRACELLULAR LIQUID IN PATIENTS TREATED WITH PREDNISOLONE FOR VIRAL HEPATITIS. (Ukr.) Lebed', O. P. (Dept. Propedeutics and Pediatrics, Vinnitsa Medical Inst., Vinnitsa, USSR). *Pediatr. Akush. Ginekol.* (6):18-19; 1976.

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2390 CLINICAL SIGNIFICANCE OF ANTIGENEMIA DETERMINED DURING VIRAL HEPATITIS IN CHILDREN. (Rus.) Petrunin, Iu. P.; Bokovoy, A. G. (Dept. Childhood Infectious Diseases, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 21(10):25-28; 1976.

2391 TREATMENT OF HEPATIC COMA IN CHILDREN WITH VIRAL HEPATITIS. (Ukr.) Starodub, N. S.; Vereshchagin, I. A.; Nikitiuk, L. S. (Donetsk Medical Inst., Donetsk, USSR). *Pediatr. Akush. Ginekol.* (6):20-21; 1976.

2392 STUDY OF THE EFFICACY OF VARIOUS METHODS IN THE TREATMENT OF VIRAL HEPATITIS. (Rus.) Zavgorodnii, V. I. (Dept. Infectious Diseases, Tselinograd Medical Inst., Tselinograd, USSR). *Vrach. Delo* (2):132-134; 1977.

2393 COMPARATIVE STUDY OF THREE PASSIVE INVERSE HEMAGGLUTINATION TECHNIQUES FOR THE DETECTION OF HBs ANTIGEN. [Letter to Editor]. (Fre.) Chevallier, P.; Trepo, D.; Trepo, C.; Sepetjian, M. (Laboratoire d'Hygiene, Domaine Rockefeller, 8, av. Rockefeller, F 69373 Lyon Cedex 2, France). *Nouv. Presse Med.* 6(22):1975; 1977.

2394 THERAPEUTIC EFFECT OF DELAGIL (QUINGAMINE) IN VIRAL HEPATITIS. (Rus.) Vanat, I. M.; Pasternak, I. I.; Stashevskaia, Z. A.; Riabyshenko, V. O. (Velikoglubochetsk Central Regional Hosp., Ternopol Oblast, Velikoglubochetsk, USSR). *Vrach. Delo* (2):134-135; 1977.

2395 SIGNIFICANCE OF THE PHYSICAL FITNESS OF PATIENTS WITH SUBSIDING VIRAL HEPATITIS: RELEVANCE OF THE BROMSULPHALEIN TEST. (Ger.) Weigl, E.; Bach, H.; Sieber, H. (Krankenhauses Eisenhuttenstadt, Friedrich-Engels-Str. 39, DDR-122 Eisenhuttenstadt, E. Germany). *Dtsch. Gesundheitsw.* 32(22):1023-1027; 1977.

2396 INFLUENCE OF PHYSICAL ACTIVITY ON CERTAIN BIOHUMORAL PARAMETERS IN THE COURSE OF ACUTE VIRAL HEPATITIS (A-B). (Ita.) Morettini, A.; Bartoletti, L.; Chibbaro, G.; De Cecco, A.; Gabrielli, M.; Ghetti, A.; *et al.* (Archispedale de Santa Maria Nuova e Stabilimenti Riuniti, Florence, Italy). *Recent. Prog. Med. (Roma)* 62(3): 295-310; 1977.

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2398 PREVENTION OF HEPATITIS B BY VACCINATION. (Fre.) Maupas, Ph.; Coursaget, P.; Goudeau, A.; Drucker, J.; Andre, M.; Barin, F.; Raynaud, B. (Faculte de medecine et de pharmacie, Universite Tours, 2 bis, boulevard Tonnelle, F 37023 Tours Cedex, France). *Rev. Prat.* 27(29): 1919-1930; 1977.

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2401 CURRENT EPIDEMIOLOGICAL ASPECTS OF INFECTIOUS AND SERUM HEPATITIS. (Rus.) Tareev, E. M.; Shatrov, I. I.; Mastiukova, Iu. N. (No affiliation given). *Sov. Med.* (2):40-46; 1977.

2402 IMMUNOMORPHOLOGICAL STUDY OF THE ACTIVITY OF A PROCESS INDUCED BY VIRAL AGENTS IN CHRONIC LIVER DISEASES. (Rus.) Barinsky, I. F.; Semendyaeva, M. E.; Lorie, N. Yu.; Bezprozvanny, B. K. (D. I. Ivanovskii Inst. Virology, USSR Acad. Medical Sciences, USSR). *Sov. Med.* (12):47-50; 1976.

2403 A HEMOPOIETIC SYSTEM DISORDER IN VIRAL HEPATITIS. (Rus.) Golzand, I. V.; Blagoslovensky, G. S.; Popova, L. A.; Petrova, E. M.; Golovanova, L. V. (Clinic Viral Hepatitis, Leningrad Scientific Res. Inst. Childhood Infections, Leningrad, USSR). *Klin. Med. (Mosk.)* 54(8):33-37; 1976.

2404 ASYMPTOMATIC CARRIERS OF HEPATITIS B-ASSOCIATED ANTIGEN (HBsAg) AMONG VOLUNTARY BLOOD DONORS IN QUEBEC. (Fre.) Valet, J. P.; Rousseau, C.; Ackermann, H. W. (Centre Hospitalier de l'Universite, 2705, boul. Laurier, Quebec, Quebec G1V 4G2, Canada). *Union Med. Can.* 106(7):966-970; 1977.

2405 NONSPECIFIC IMMUNITY IN CHILDREN WITH VIRAL HEPATITIS. (Rus.) Safonova, E. S.; Mikhailova, Z. M. (Moscow Oblast M. F. Vladimirskii Scientific Res. Clinical Inst., Moscow, USSR). *Pediatriia* (3):27-29; 1977

2406 DYNAMICS OF T- AND B-LYMPHOCYTES IN PATIENTS WITH VIRAL HEPATITIS. (Rus.) Belozerov, E. S.; Arkhipov, G. S.; Sagandykov, B. B.; Shabalin, V. V. (Dept. Infectious Diseases, Semipalatinsk Medical Inst., Semipalatinsk, USSR). *Klin. Med. (Mosk.)* 54(11):24-26; 1976.

2407 INTRACELLULAR METABOLIC ACTIVATION IN NEUTROPHILS OF CHILDREN WHO ARE LONG-TERM HBsAg CARRIERS. (Ita.) Vierucci, A.; De Martino, M.; Moggi, C.; Zuccati, G.; Calabri, G. (Istituto di Clinica Pediatrica dell'Universita di Firenze, Florence, Italy). *Minerva Pediatr.* 29(13):935-937; 1977.

2408 HEPATOLOGICAL ASPECTS OF HBsAg-POSITIVE BLOOD DONORS. (Ger.) Schimmelpfennig, W.; Wack, V.; Wack, R.; Schneider, G.; Lunzenauer, K.; Wicht, U.; Schaffner, U. (II. Medizinischen Klinik des Bereichs Medizin [Charite] der Humboldt-

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2410 SERUM BILE SALTS IN LIVER DISEASES [Abstract]. (Fre.) Annoni, G.; Barbi, G. L.; Donati, C.; Ideo, G.; Dioguardi, N. (Istituto di Clinica Medica III, Universita degli Studi di Milano, Milan, Italy). *Gastroenterol. Clin. Biol.* 1(5):487; 1977.

2411 SEVERE HEMORRHAGE OF THE DIGESTIVE TRACT IN THE COURSE OF ACUTE VIRAL HEPATITIS. (Ita.) Mazzacuva, D.; Tarozzi, C. A. (Ospedale Civile di Imola, Imola, Italy). *Minerva Pediatr.* 29(9):637-639; 1977.

See also, 1903, 2010, 2327, 2330, 2331, 2344, 2414, 2416, 2417, 2418, 2423, 2429, 2541.

LIVER AND BILIARY TRACT

Chronic Hepatitis

2412 CHRONIC ACTIVE HEPATITIS AND PULMONARY HYPERTENSION. (Eng.) Cryer, P. E.; Kissane, J. M.; Pierce, J.; Biello, D.; Kuhn, C., III; Lander, J.; *et al.* (Washington Univ. Sch. Medicine, St. Louis, MO). *Am. J. Med.* 63(4):604-613; 1977.

A 46-yr-old woman suffered cardiopulmonary arrest and died shortly after a second hospitalization for shortness of breath. She had been hospitalized 4 yr earlier for what was diagnosed as viral hepatitis, but had an apparently uneventful recovery. She had been taking a phenothiazine preparation, which she continued to take throughout the next year. Chronic active hepatitis, cirrhosis, and slight cardiomegaly were noted when she was rehospitalized 2.5 yr later for extreme shortness of breath. A cushingoid appearance developed after treatment with prednisone (20 mg/day), and the dosage was decreased to 5 mg/day. The diagnosis of chronic active hepatitis and cirrhosis was reconfirmed when the patient was rehospitalized 1 yr later. Pulmonary hypertension was also confirmed, and she appeared not to have a cardiomyopathy. The final anatomic diagnosis was chronic active hepatitis with cirrhosis of the liver, mild glomerulonephritis, chronic pancreatitis, primary pulmonary hypertension, and a small pulmonary thromboembolus.

2413 FIBROBLAST INTERFERON IN HBsAg-POSITIVE CHRONIC ACTIVE HEPATITIS [Letter to Editor]. (Eng.) Weimar, W.; Heijtink, R. A.; Schalm, S. W.; Van Blankenstein, M.; Masurel, N.; Edy, V. G.; *et al.* (Dept. Gastroenterology, Erasmus Univ. Rotterdam, Rotterdam, Netherlands). *Lancet* 2(8051):1282; 1977.

2414 SERUM IMMUNOREACTIVE PROLYL HYDROXYLASE IN LIVER DISEASE [Abstract]. (Eng.) Tuderman, L.; Risteli, J.; Miettinen, T. A.; Kivirikko, K. I. (Dept. Medical Biochemistry, Univ. Oulu, Oulu, Finland). *Scand. J. Gastroenterology* 12 (Suppl. 45):107; 1977.

2415 BILIARY BILE ACIDS IN CHRONIC ACTIVE HEPATITIS AND PRIMARY BILIARY CIRRHOSIS. THE SIGNIFICANCE OF ORCEIN POSITIVITY [Abstract]. (Eng.) Kesaniemi, Y. A.; Miettinen, T. A.; Salaspuro, M. P.; Sipponen, P. (Second Dept. Medicine, Univ. Helsinki, Helsinki, Finland). *Scand. J. Gastroenterol.* 12(Suppl. 45):45; 1977.

2416 THE IMPORTANCE OF CIRCULATING HEPATITIS B CORE ANTIGEN (HBcAg) IN CHRONIC HEPATITIS (CH) AND ITS RELATIONSHIP TO OTHER MARKERS OF HEPATITIS B VIRUS (HBV) INFECTION [Abstract]. (Eng.) Sagnelli, E.; Vermace, S. J.; Paronetto, F. (Mount Sinai Sch. Medicine, New York, NY). *Gastroenterology* 73(5):1245; 1977.

2417 LONG-TERM FOLLOW-UP AFTER HBsAg-NEGATIVE HEPATITIS [Abstract]. (Eng.) Rakela, J.; Redeker, A. G. (Univ. Southern California Sch. Medicine, Los Angeles, CA). *Gastroenterology* 73(5):1241; 1977.

2418 HEPATITIS A VIRUS INFECTION IN CHRONIC ACTIVE HEPATITIS [Abstract]. (Eng.) Rakela, J.; Redeker, A. G.; Mosley, J. W. (Univ. Southern California Sch. Medicine, Los Angeles, CA). *Gastroenterology* 73(5):1241; 1977.

See also, 2331, 2344, 2363, 2402, 2410, 2423, 2433, 2462, 2463, 2464, 2465, 2524.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

2419 THE ROLE OF ZINC DEFICIENCY IN HEPATIC ENCEPHALOPATHY [Abstract]. (Eng.) McClain, C. J. (Minneapolis Veterans Hosp., Minneapolis, MN). *Gastroenterology* 73(5):1233; 1977.

2420 GLYCEROL CLEARANCE AS A TEST OF GLUCONEOGENESIS IN ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Johnston, D. G.; Wright, R.; Alberti, K. G. M. M. (Southampton General Hosp., Southampton, England). *Digestion* 16(4):330; 1977.

2421 MONOOXYGENASE ACTIVITY IN LIVER BIOPSY SPECIMENS OF PATIENTS WITH ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Hoensch, H.; Hartmann, F.; Schomerus, H.; Reifferscheid, P. (Dept. Medicine, Univ. Tubingen, Tubingen, W. Germany). *Digestion* 16(4):352; 1977.

2422 PLASMA ALPHA AMINO-n-BUTYRIC ACID TO LEUCINE (A/L) RATIO: NONSPECIFICITY AS A MARKER FOR ALCOHOLISM [Abstract]. (Eng.) Dienstag, J. L.; Carter, E. A.; Wands, J. R.; Isselbacher, K. J.; Fischer, J. E. (Massachusetts General Hosp., Boston, MA). *Gastroenterology* 73(5):1217; 1977.

2423 CARCINO-EMBRYONIC ANTIGEN IN NORMAL AND DISEASED LIVER TISSUE [Abstract]. (Eng.) Thung, S. N.; Gerber, M. A. (Mount Sinai Sch. Medicine, New York, NY 10029). *Fed. Proc.* 37(3):303; 1978.

2424 DOUBLE BLIND CONTROLLED TRIAL OF CORTICOSTEROID THERAPY IN SEVERE ALCOHOLIC HEPATITIS WITH ENCEPHALOPATHY [Abstract]. (Eng.) Depew, W. T.; Boyer, T. D.; Omata, M.; Redeker, A. G.; Reynolds, T. B. (Univ. Southern California Sch. Medicine, Los Angeles, CA). *Clin. Res.* 26(2):150A; 1978

2425 THE EFFECT OF CHRONIC ETHANOL ABUSE ON DELAYED HYPERSENSITIVITY EVALUATED BY MEANS OF A SKIN TEST. (Pol.) Caban, M.; Szczepaniec, M.; Mika, M. (Klinika Gastroenterologiczna Instytutu Medycyny Wewnetrznej AM, ul. Kopernika 15, 31-501 Krakow, Poland). *Pol. Tyg. Lek.* 32(8):311-312; 1977.

2426 CLINICAL MANIFESTATIONS OF ALCOHOLIC LIVER CIRRHOSIS. (Rus.) Mukhin, A. S.; Lebedev, S. P.; Lopatkina, T. N. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 49(2):69-74; 1977.

2427 TREATMENT OF HEPATIC STEATOSIS WITH PHOSPHORYLCHOLINE, HOMOCYSTEINE-GAMMA-THIOLACTONE AND VITAMIN B_{12}. CONTROLLED CLINICAL TRIAL. (Ita.) De Candia, O.; Mancinella, A.; Bartolucci, E.; Largajolli, F. (Ospedale Civile "Carreta," 31044 Montebelluna, Italy). *Clin. Ter.* 77(3):251-262; 1976.

2428 EXCESSIVE GENERALIZED FAT EMBOLISM IN ACUTELY DYSTROPHIC FATTY LIVER. (Ger.) Schulz, F.; Hildebrand, E. (Gesundheitsbehorde der Freien und Hansestadt Hamburg, Hamburg, W. Germany). *Med. Klin.* 72(2):59-63; 1977.

2429 DIFFERENTIAL DIAGNOSIS OF ALCOHOLIC AND VIRAL LIVER DISEASES. (Rus.) Mukhin, A. S.; Semendyaeva, M. E.; Blinkov, I. L.; Vinogradova, L. G. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (5):7-13; 1977.

See also, 1894, 1991, 2414, 2524.

LIVER AND BILIARY TRACT

Cirrhosis

2430 LIVER IMAGING DURING RETICULOENDOTHELIAL FAILURE. (Eng.) Antar, M. A.; Sziklas, J. J.; Spencer, R. P. (Veterans Admin Hosp., Newington, CT). *Clin. Nucl. Med.* 2(9):293-295; 1977.

The cases of two men with hepatic cirrhosis in whom the liver could not be visualized by means of i.v. administered ^{99m}Tc-sulfur colloid are described. There was thus hepatic "reticuloendothelial failure." In one case, the liver could be imaged following the i.v. administration of ^{67}Ga-citrate. In the second case, the liver retained some ability to accumulate ^{131}I-rose bengal. These cases emphasize the fact that one class of radiopharmaceuticals may be accumulated while another is not.

2431 PRESYMPTOMATIC PRIMARY BILIARY CIRRHOSIS. (Eng.) Hanik, L.; Eriksson, S. (Malmo

General Hosp., Malmo, Sweden). *Acta Med. Scand.* 202(4):277-281; 1977.

Clinical, laboratory, and follow-up results in 13 patients with asymptomatic primary biliary cirrhosis (PBC) collected during the last 10 yr in one hospital that serves a population of 250,000 inhabitants are presented. The mean observation time was 5.5 yr. Seventy-seven percent of these patients were asymptomatic at the time of diagnosis. Characteristic laboratory features in these asymptomatic patients were high alkaline phosphatase and glutamyl transpeptidase levels and very high levels of polyclonal IgM. The ESR was often increased. Signs of active cell destruction were slight, and functioning cell mass was well preserved. High titers of mitochondrial antibodies were consistently present. Needle biopsy was seldom sufficient for diagnosis but permitted staging of the disease. There was no correlation between clinical features and histological evolution stage. Compared with a preceding 10-yr period, the incidence of PBC has risen threefold. This increase can be fully explained by the extended use of laboratory facilities, resulting in the detection of PBC in asymptomatic patients.

2432 AN IMPROVED METHOD FOR MEASURING BLOOD MERCAPTANS.

(Eng.) Doizaki, W. M.; Zieve, L. (Minneapolis Veterans Hosp., Univ. Minnesota, Minneapolis, MN 55417). *J. Lab. Clin. Med.* 90(5):849-855; 1977.

An improved method for measuring blood methanethiol (MT), in which zinc was used as a reducing agent and a more sensitive gas chromatograph was employed, is described. The method can be used for measuring covalently bound MT that was not previously detected and permits determinations in patients for the first time. The average normal whole-blood MT in rat blood was 200 ± 42 pmol/ml and in human blood 229 ± 29 pmol/ml. Eleven rats in experimental hepatic coma following acute massive hepatic necrosis had blood levels 4 to 18 times the average normal, and seven cirrhotic patients with hepatic encephalopathy or coma had blood levels 4 to 5 times the average normal.

2433 IN VITRO CELL-MEDIATED CYTOTOXICITY IN PRIMARY BILIARY CIRRHOSIS AND CHRONIC HEPATITIS: DYSFUNCTION OF SPONTANEOUS CELL-MEDIATED CYTOTOXICITY IN PRIMARY BILIARY CIRRHOSIS.

(Eng.) Vierling, J. M.; Nelson, D. L.; Strober, W.; Bundy, B. M.; Jones, E. A. (Natl. Inst. Health, Bethesda, MD 20014). *J. Clin. Invest.* 60(5):1116-1128; 1977.

The *in vitro* cytotoxic function and target cell specificity of peripheral blood lymphocytes from 10 patients with primary biliary cirrhosis and 9 with hepatitis B surface antigen-negative chronic hepatitis were investigated using ^{51}Cr-labeled human Chang and EL-4 mouse sarcoma cell targets in assays of spontaneous cell-mediated cytotoxicity (SCMC) and mitogen-induced cellular cytotoxicity (MICC). In addition, antibody-dependent cellular cytotoxicity (ADCC) against Chang cells was assessed. At an effector-to-target cell ratio of 100:1, the mean SCMC against Chang cells was much less in patients with primary biliary cirrhosis than that in either the 11 healthy controls ($p<0.001$) or the patients with chronic hepatitis ($p<0.005$), whereas the value for patients with chronic hepatitis did not differ significantly from that of the controls. The mean SCMC against EL-4 mouse sarcoma cells was also less in patients with primary biliary cirrhosis than in the controls ($p<0.005$), whereas the value for chronic hepatitis was not significantly different from that of the controls or patients with primary biliary cirrhosis. In contrast, MICC against both targets and ADCC against Chang cells were similar for each group. Comparison of SCMC and MICC against both target cells, measured simultaneously, showed similar cytotoxic potential against both target cells for each group. Effector cells capable of mediating cytotoxicity in each assay were defined by testing the cytotoxic function of lymphocyte subpopulations isolated from two representative patients with each disease using immunoabsorbent affinity chromatography and crystallizable fragment (Fc) receptor binding to antigen-antibody complexes. In both primary biliary cirrhosis and chronic hepatitis, SCMC and ADCC were mediated by a subpopulation of lymphocytes that lack surface immunoglobulin (sIg-) and bear Fc receptors (Fc+). In contrast, MICC was mediated by sIg-cells, which lack Fc receptos. Lymphocytes bearing sIg were not cytotoxic in any assay. These results establish that there is a difference in cytotoxic function in primary biliary cirrhosis and chronic hepatitis by defining the presence of a defect in spontaneous cytotoxic function of sIg-, Fc+ lymphocytes against Chang cells in primary biliary cirrhosis.

2434 MACROMOLECULAR LACTATE DEHYDROGENASE LINKED TO SERUM IgG OF A PATIENT WITH LIVER CIRRHOSIS.

(Eng.) Hayashi, S.; Noma, K.; Kobayashi, R.; Kosaka, K. (Okayama Univ. Medical Sch., Okayama 700, Japan). *Acta Med. Okayama* 30 (2):75-86; 1976.

An anomalous zymogram of LDH in the serum from a patient with liver cirrhosis is reported. Agar gel electrophoresis of serum showed an extra LDH band close to the anodic side of LDH5 and a wide band of LDH5. Gel filtration of the patient's serum in Sephadex G-200 demonstrated an abnormal LDH fraction eluted between IgG and macroglobulin in addition to a normal LDH component. Chromatographically abnormal LDH was demonstrated on agar gel as extra and wide LDH5 bands and resembled closely human hepatic LDH in its inhibition by urea or substrate, its stability against heat, and its K_m. Immunological analyses demonstrated that abnormal LDH could be in the state combined with IgG. The molecular weight of the complex estimated by gel filtration was approximately 300,000. Mixtures of the patient's heated serum with either normal or patient's hepatic LDH showed an abnormal LDH fraction by gel filtration, whereas the abnormal fraction was not demonstrated when heated normal serum was mixed with either normal or the patient's hepatic LDH. These results strongly suggest that the occurrence of an anomalous LDH zymogram in the patient's serum is due to a formation of LDH-IgG complex, which is based on the binding of essentially normal hepatic LDH and abnormal IgG.

2435 POTASSIUM AND MAGNESIUM DEPLETION IN PATIENTS WITH CIRRHOSIS ON MAINTENANCE DIURETIC REGIMES. (Eng.) Wheeler, P. G.; Smith, T.; Golindano, C.; Alam, A. N.; Wilkinson, S. P.; Edmonds, C. J.; *et al.* (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, England). *Gut* 18(9):683-687; 1977.

Total body potassium (^{40}K) and WBC potassium measurements were carried out in 19 patients with stable but decompensated cirrhosis maintained on diuretics for previous ascites. WBC magnesium was measured simultaneously with WBC potassium to determine whether magnesium depletion occurs in association with potassium depletion. Of 13 patients receiving spironolactone alone, none had a total body potassium below the expected lower limit of normal (3.5-5.0 mmol/l). Of six patients who were receiving frusemide (40 or 200 mg/day) together with spironolactone, two had low values. The results for WBC potassium were in agreement, and simultaneous measurements of WBC magnesium showed a close correlation, those with intracellular potassium depletion also having magnesium depletion. One such patient was treated with magnesium supplements (30 mmol/day, 1 month) without effect on the potassium level, although intracellular magnesium was improved. It is concluded that spironolactone alone is the treatment of choice in the maintenance management of such patients, that additional potassium would be unnecessary, and that additional frusemide should be avoided if possible.

2436 DIAGNOSIS OF LIVER CIRRHOSIS. (Rus.) Khazanov, A. I. (No affiliation given). *Sov. Med.* (12):44-47; 1976.

2437 MORPHOLOGY AND DIFFERENTIAL DIAGNOSIS OF PRIMARY BILIARY CIRRHOSIS AND ITS PRECIRRHOTIC STAGES. (Ger.) Roschlau, G. (Medizinische Akademie "Carl Gustav Carus," Fetscherstr. 74, DDR-8019 Dresden, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):113-115; 1976.

2438 COMPARATIVE STUDY AND DIAGNOSTIC VALUE OF IMMUNOGLOBULINS AND SERUM GAMMA-GLOBULINS IN CIRRHOSIS. (Fre.) Tranchant, D.; Quatre, J. L.; Pichot, J.; Chauvire, F.; Lux, J.; Vachon, A. (Service de Biochimie, Hotel-Dieu, France). *J. Med. Lyon* 57(1306):563-571; 1976.

2439 DIAGNOSTIC VALUE OF THE STUDY AND DETERMINATION OF ANTIMITOCHONDRIAL ANTIBODIES IN PRIMARY BILIARY CIRRHOSIS [Abstract]. (Fre.) Remacle, J. P.; Chamlian, A.; Mathieu, B.; Monges, H. (Hopital Nord, 13326 Marseille Cedex 3, France). *Gastroenterol. Clin. Biol.* 1(5):489; 1977.

2440 VALUE OF SERUM PREALBUMIN DETERMINATION IN THE DIAGNOSIS OF LIVER CIRRHOSIS: PRELIMINARY RESULTS [Letter to Editor]. (Fre.) Savoye, B.; Pillon, M.; Girard, M.; Vernet-Nyssen, M.; Dorche, J. (Hopital de la Croix Rousse, 93, Grand Rue de la Croix Rousse, F 69317 Lyon Cedex 1, France). *Nouv. Presse Med.* 6(22):1973-1974; 1977.

2441 PANCREATICOPERITONEAL FISTULA DIAGNOSED IN AN INFANT WITH HEMORRHAGIC ASCITES. (Fre.) Navarro, J.; Guran, P.; Boureau, M.; Nicoladze, D.; Weisgerber, G.; Roussel, P.; Perrier, M. (Hopital Trousseau, 75012 Paris, France). *Arch. Fr. Pediatr.* 34(3):258-264; 1977.

2442 DIFFICULT CASES OF INTERPRETATION OF SPLENOPORTOGRAMS IN CHILDREN WITH PORTAL HYPERTENSION. (Rus.) Leontiev, A. F.; Markov, B. A.; Osipov, Yu. N. (Clinic Surgery, Inst. Pediatrics, USSR Acad. Medical Sciences, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):52-58; 1977.

2443 IS TREATMENT NECESSARY FOR CIRRHOTIC ASCITES? (Fre.) Caulin, C.; Wagner, J. C.; Lamotte, M. (Hopital Lariboisiere, 2, rue Ambroise-Pare, 75475 Paris Cedex 10, France). *Sem. Hop. Ther.* 53(1):55-56; 1977.

2444 DEMECLOCYCLINE TREATMENT OF LIVER CIRRHOSIS PATIENTS FOR WATER AND MINERAL RETENTION. (Fre.) de Troyer, A.; Zegers de Beyl, D.; Demanet, J. C. (Hopital Universitaire Saint-Pierre, Brussels, Belgium). *J. Urol. Nephrol. (Paris)* 83(4/5):302-306; 1977.

2445 THE EFFECT OF DIURETIC THERAPY ON ACID-BASE EQUILIBRIUM AND ELECTROLYTE CONTENT IN PATIENTS WITH LIVER CIRRHOSIS AND ASCITES. (Rus Loginov, A. S.; Sakharova, T. N. (Central Scientifi Res. Inst. Gastroenterology, Moscow, USSR). *Sov. Med.* (12):53-59; 1976.

2446 MORPHOLOGICAL SUBSTANTIATION OF LIVER CIRRHOSIS TREATMENT WITH RETABOLIL. (Rus.) Ryabinina, N. E.; Markov, R. M. (Dept. Pharmacology, Chelyabinsk Medical Inst., Chelyabinsk, USSR). *Farmakol. Toksikol.* 39(5):625-627; 1976.

2447 RESULTS OF CONSERVATIVE AND SURGICAL TREATMENT OF ASCITES. (Ger.) Schimmelpfennig, W.; Burger, K.; Schneider, G.; Wagner, K.; Luning, M. (II. Medizinische Klinik des Bereichs Medizin, Humboldt-Universitat, Schumannstr. 20/21, DDR-104 Berlin, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):157-158; 1976.

2448 ANALYSIS OF 28 CASES OF MESENTERIC-CAVAL ANASTOMOSIS WITH PROSTHESIS IN PATIENTS WITH HEMORRHAGE OR ASCITES DUE TO LIVER CIRRHOSIS [Abstract]. (Ita.) Goffrini, P. A.; Peracchia, A.; Morosini, S.; Roncoroni, L.; Sgobba, G.; Violi, V. (No affiliation given). *Rass. Int. Clin. Ter.* 57(7):497; 1977.

2449 CORRELATION BETWEEN THE CLINICAL COURSE AND THE HISTOLOGICAL PICTURE FOLLOWING SURGERY FOR PORTAL HYPERTENSION DUE TO CIRRHOSIS [Abstract]. (Ita.) Sgobba, G.; Violi, V.; Beduschi, G.; Roncoroni, L.; Morosini, S.; Peracchia, A. (No affiliation given). *Rass. Int. Clin. Ter.* 57(7): 497; 1977.

2450 PORTACAVAL ANASTOMOSIS IN CIRRHOTIC PATIENTS WITH PORTAL HYPERTENSION: PERSONAL EXPERIENCE. (Ita.) Bucciarelli, G.; Bertini, D.; Biliotti, G. C.; Bechi, P.; Bicchielli, E.; Stefani, P.; Celiberti, A. (Istituto di Clinica Chirurgica e Terapie Chirurgica, Universita di Firenze, Florence, Italy). *Ann. Ital. Chir.* 48(2):189-208; 1976.

2451 MODERN ASPECTS OF SURGERY IN PORTAL HYPERTENSION. (Ger.) Bengmark, S.; Borjesson, B. (Chirurgische Universitatsklinik, S-22185 Lund, Lasarettet, Sweden). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):165-169; 1976.

2452 INFLUENCE OF THE INFUSION OF AMMONIA LEVEL-REDUCING AMINO ACIDS ON THE DETOXIFYING CAPACITY OF THE LIVER IN PATIENTS WITH LIVER CIRRHOSIS WITH OR WITHOUT PORTAL ENCEPHALOPATHY. (Ger.) Muting, D.; Reikowski, J.; Horbach, L. (Heinz-Kalk-Klinik fur Innere Medizin, Bad Kissingen, W. Germany). *Therapiewoche* 26(37):5654-5667, *passim;* 1976.

2453 LIFE EXPECTANCY OF LIVER CIRRHOSIS PATIENTS TREATED CONSERVATIVELY AND WITH THE USE OF ORGAN ANASTOMOSES. (Rus.) Afanisieva, K. A. (Dept. Internal Diseases of Pediatric Faculty, A. V. Lunacharskii Astrakhan Medical Inst., Astrakhan, USSR). *Klin. Med. (Mosk.)* 54(7):88-91; 1976.

2454 PORTACAVAL SHUNT IN THE TREATMENT OF PORTAL HYPERTENSION WITH SPECIAL REFERENCE TO THE ARTERIALIZATION OF INTRAHEPATIC PORTAL CIRCULATION. (Ger.) Wolff, H. (Medizinische Akademie "Carl Gustav Carus," Fetscherstr. 74, DDR-8019 Dresden, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):175-176; 1976.

2455 ETIOLOGY, SHORT-TERM PROGNOSIS AND TREATMENT OF HEMORRHAGE OF THE UPPER SEGMENT OF THE GASTROINTESTINAL TRACT IN CIRRHOTIC PATIENTS: REPORT OF 100 CASES. (Fre.) Doffoel, M.; Coumaros, D.; Girard, M.; Dauchel, J.; Bockel, R. (Centre Hospitalo-Universitaire, 67005 Strasbourg, France). *Rev. Fr. Gastroenterol.* (127):25-38; 1977.

2456 CLINICAL AND THERAPEUTIC ASPECTS OF PORTAL HYPERTENSION FROM THE VIEWPOINT OF INTERNAL MEDICINE. (Ger.) Schneider, G.; Burger, K.; Schimmelpfennig, W.; Wagner, K.; Zimmermann, H. B. (II. Medizinische Klinik der Charite, Schumannstr. 20/21, DDR-104 Berlin, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):163-164; 1976.

2457 PRIMARY BILIARY CIRRHOSIS ASSOCIATED WITH RHEUMATOID POLYARTHRITIS AND ACUTE POLYMYOSITIS. (Fre.) Benoist, M.; Henin, D.; Kahn, M. F.; Benhamou, J. P. (Hopital Bichat, 170 bd Ney, F 75877 Paris Cedex 18, France). *Nouv. Presse Med.* 6(27):2427-2429; 1977.

2458 HEMORRHAGE OF ESOPHAGEAL VARICES IN PORTAL HYPERTENSION. (Ger.) Schmidt, H. D.; Brunner, H.; Loth, R.; Wendling, P.; Gunther, M.; Farack, P. (Chirurgische Klinik, Universitat Mainz, Langenbeckstr. 1, D-6500 Mainz, W. Germany). *Munch. Med. Wochenschr.* 119(9):299-304; 1977.

2459 BLOOD CLOTTING CHANGES IN PORTAL HYPERTENSION. (Ger.) Jablonska, M.; Doskova, M.; Balas, V.; Richter, V.; Souckova, E. (IV. Innere Klinik, Karls-Universitat, U. nemocnice 2, CSSR-12 000 Prague 2, Czechoslovakia). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):151-152; 1976.

2460 LIVER HISTOLOGY IN VARIOUS FORMS OF PORTAL HYPERTENSION. (Ger.) Schmid, M. (Stadtspital Waid, Tiechestr. 99, CH-8037 Zurich, Switzerland). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4): 147-149; 1976.

2461 PLASMA COTRIMOXAZOLE LEVELS IN PATIENTS WITH HEPATIC INSUFFICIENCY. (Ita.) Angelucci, L.; Baldieri, M.; Barba, C.; Lentini, S.; Linari, G.; Stocchi, F. (Istituto di Farmacologia e Farmacognosia, Facolta di Farmacia, Universita di Roma, Rome, Italy). *Clin. Ter.* 81(2):111-122; 1977.

2462 CHANGES IN THE EXOCRINE FUNCTION OF THE PANCREAS IN PATIENTS WITH LIVER CIRRHOSIS AND CHRONIC HEPATITIS. (Ger.) Brailski, Ch.; Mendisova, A.; Braikow, N.; Diwok, K. (Institut fur Gastroenterologie, Ul belo more 7, Sofia/VR, Bulgaria). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(5/6):269-274; 1976.

2463 EXOCRINE FUNCTION OF THE PANCREAS IN LIVER CIRRHOSIS AND CHRONIC HEPATITIS.

(Ger.) Diwok, K.; Curschmann, D.; Rostock, K.; Brailski, Ch. (Klinik fur Innere Medizin der Wilhelm-Pieck-Universitat, Ernst-Heydemann-Strasse, DDR-25 Rostock 1, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(5/6):275-280; 1976.

2464 IMMUNOLOGICAL OBSERVATIONS IN PRIMARY BILIARY CIRRHOSIS AND LUPOID HEPATITIS. (Ger.) Loginov, A. S. (Zentrales Forschungsinstitut fur Gastroenterologie, Chaussee der Enthusiasten 200, 111 123 Moscow, USSR). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):117-119; 1976.

2465 MONOCLONAL IMMUNOGLOBULINS IN CHRONIC LIVER DISEASES. (Ger.) Zimmermann, S.; Kratzsch, K. H.; Lewicki, I. (Bezirkskrankenhaus, Burgerstr. 2, DDR-90 Karl-Marx-Stadt, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):135-136; 1976.

2466 PATHOGENESIS OF DISORDERS OF VITAMIN B_{12} ABSORPTION IN THE INTESTINE OF LIVER CIRRHOSIS PATIENTS. (Rus.) Agzamkhodzhaev, S. M.; Verniaeva, T. I. (Tashkent Medical Inst., Tashkent, USSR). *Med. Zh. Uzbek.* (11):52-55; 1976.

2467 INTERACTIONS BETWEEN THE SPLEEN AND LIVER. (Ger.) Trux, F.; Sundermann, A. (Medizinischen Akademie, Nordhauser Strasse 74, DDR-50 Erfurt, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(5/6):293-298; 1976.

See also, 1900, 1909, 2010, 2331, 2349, 2372, 2402, 2410, 2412, 2414, 2415, 2524, 2535.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

2468 GREY-SCALE ULTRASONOGRAPHY OF PORTAL VEIN. (Eng.) Webb, L. J.; Berger, L. A.; Sherlock, S. (Royal Free Hosp., Pond St., Hampstead, London NW3 2QG, England). *Lancet* 2(8040):675-677; 1977.

The results of gray-scale ultrasonography of the portal vein were compared with those of splenic venography or superior mesenteric arteriography. The state of the extrahepatic portal venous system was correctly assessed by grey-scale ultrasonography in 21 patients with extrahepatic portal vein obstruction tested, and the results agreed with those obtained by portal venography. In all 22 age-matched controls, a patent portal vein was displayed. The diameter of the portal vein on the ultrasound scan was significantly less in the 22 controls than in 18 patients with chronic liver disease. Grey-scale ultrasonography is a reliable, inexpensive, and noninvasive method for diagnosing extrahepatic portal vein obstruction.

2469 HISTOPATHOLOGICAL STUDIES ON THE PROGNOSIS OF BILIARY ATRESIA. (Eng.) Chiba, T. (Tohoku Univ. Sch. Medicine, Sendai 980, Japan). *Tohoku J. Exp. Med.* 122(3):249-258; 1977.

Liver specimens from 68 patients with biliary atresia were examined to correlate histology with the postoperative prognosis. The histological findings were classified by the degree of fibrosis, bile duct proliferation, bile plugs, giant cell transformation, and intralobular cholestasis. Morphometrical studies of the interstitial area, bile duct (ductules), intrahepatic portal vein, and intrahepatic artery were carried out and correlated with the age of the patients and with operative results. Marked fibrosis (cirrhosis) and interstitial areas occupying more than 35% of the sectional area of the liver specimen were indicative of a poor prognosis. Other factors that indicated poor postoperative bile excretion included (a) severe ductular proliferation, shown by proliferated bile ducts occupying more than 20% of interstitial areas, (b) no or slight intralobular cholestasis, and (c) marked interlobular cholestasis.

2470 CONTROLLED STUDY OF CHENODEOXYCHOLIC ACID AS A CHOLERETIC AGENT. (Eng.) Salvioli, G. F.; Zambarda, E.; Frigerio, G. (Inst. Internal Medicine, Univ. Modena, Modena, Italy). *Curr. Ther. Res.* 22(3):529-535; 1977.

A controlled double-blind trial was carried out in 12 patients after cholecystectomy to study the choleretic activity of chenodeoxycholic acid (CDCA) and of its combination with fentonium bromide. The patients received either placebo (control), 250 mg dehydrocholic acid (DHCA, as a reference drug), 250 mg chenodeoxycholic acid (CDCA), or 125 mg CDCA plus 20 mg fentonium bromide, all in capsule form. Each preparation was administered in a total dose of four capsules, one at 8 a.m., one at 11 a.m., one at 2 p.m., and one at 5 p.m. On the test day, the bile was collected from biliary fistula (T-tube) for periods of 24 hr starting from 8 a.m., on the assumption that after 4 to 5 days the external flow has a good correlation with the total flow.

The observations were carried out according to a balanced incomplete blocks design, comparing two preparations in each patient. The statistical analysis was performed using the intra-block information to adjust the means and the deviances of the experimental data. The drugs showed significant ($p<0.01$ or $p<0.05$) choleretic effects compared to placebo, whereas small and not significant differences between drugs were ascertained. The combination of CDCA and fentonium bromide, although containing a half dose of CDCA, produced a similar effect to the other active preparations. No side-effects occurred.

2471 RADIOLOGIC EVALUATION OF THE BILE DUCTS CONDITION AFTER SURGERY FOR CHOLELITHIASIS.

(Pol.) Zalewski, J.; Szmurlo, J.; Bernacki, E.; Markiewicz, W. (Clinic Gastroenterological Surgery, Inst. Surgery, Bialystok, Poland). *Pol. Tyg. Lek.* 32(10):385-388; 1977.

Postoperative cholangiography provides valuable information on anatomy of the bile ducts, condition and function of papilla, and is a test for correctly performed surgery. The test was performed on 534 patients fasted with Kehr's T-drains in the common bile duct on the 10-12th postoperative day. In each subject, three to four cholangiograms were made, and the last one was focused on the papilla. Correct shape, width, and arrangement of the bile ducts and passage of the radio-opaque substance into the duodenum were observed in four of eight patients. In 20% of the patients with plastics of the papilla, intrahepatic bile ducts were not visualized, and the passage of the contrast substance into duodenum was unhampered. In 22 patients, concretions overlooked during surgery were detected. Dilatation of the bile ducts was observed in 43 subjects with inflammatory contraction of the papilla. This diagnosis was of great practical significance, and prolonged external drainage was employed. Complete obstruction of the terminal part of common bile duct was found in 15 patients after surgery for carcinoma of the head of pancreas or duodenal papilla. Deposition of the contrast substance in the terminal part of Wirsung's duct was detected in 194 subjects, although its cause was not known. Properly performed cholangiography is safe and painless. It is an important test of prognostic significance.

2472 PITFALLS IN SERUM BILE ACID ANALYSIS IN PATIENTS WITH CHOLESTASIS: DIFFERING BIOCHEMICAL PROPERTIES OF 3-HYDROXYSTERIOD DEHYDROGENASES FROM WILD-TYPE AND MUTANT Ps. testosteroni.

(Eng.) Bolt, M. G.; Boyer, J. L. *In: Bile Acid Metabolism in Health and Disease.* Edited by G. Paumgartner and A. Stiehl. (Baltimore: University Park Press): 285-292; 1977.

The use of mutant *P. testosteroni* for the photofluorometric measurement of serum bile acids from patients with cholestasis resulted in values that were 30 to 50% lower than those obtained with wild-type *P. testosteroni.* The reason for this discrepancy was studied. Differences in substrate specificity for the unesterified 3β-OH group in the assay of cholestatic sera did not contribute to the difference. Rather, the discrepancy was due to a low affinity of the mutant enzyme for bile acid substrates and NADH degradation catalyzed by both the mutant and wild-type enzymes. The low affinity of the mutant enzyme can be abolished in assay systems that are of high ionic strength; there will be a concomitant slight decline in maximum velocity. The enzyme-associated degradation of NADH can be prevented by the use of hydrazine, either as the hydrate or the sulfate, or by further purification of the enzyme on Sephadex G-200. The data indicate that differences in biochemical properties between mutant and wild-type *P. testosteroni* must be considered if they are to be used with validity in the assay of bile acids. Optimal assay conditions using the two sources of enzyme may not always be interchangeable.

2473 INTERMITTENT CHOLESTATIC JAUNDICE AND NONMETASTATIC PROSTATIC CARCINOMA.

(Eng.) Reddy, A. N.; Grosberg, S. J.; Wapnick, S. (Brooklyn Veterans Admin. Hosp., 527/111, Brooklyn, NY 11209). *Arch. Intern. Med.* 137(11):1616-1617; 1977.

A patient with intermittent cholestatic jaundice and metastatic prostatic adenocarcinoma that had spared the liver and extrahepatic biliary tree is described. He had puzzling episodes of jaundice for 2.5 yr following a transurethral resection for the carcinoma. The results of appropriate investigations and an exploratory laparotomy performed during the patient's four antemortem hospitalizations were indicative of "recurrent intrahepatic cholestasis," the cause of which remained an enigma even after exploratory laparotomy. At autopsy, no evidence of hepatic metastases or extrahepatic biliary obstruction was found. Alcohol, hepatotoxic drugs, toxins, viral and chronic active hepatitis, hemolysis, and extrahepatic biliary obstruction were eliminated as causes of the jaundice. Intermittent intrahepatic cholestasis may be one of the nonmetastatic manifestations (nonmetastatic hepatopathy of malignancy) of prostatic adenocarcinoma.

2474 CLINICOPATHOLOGIC CLASSIFICATION OF CONGENITAL CYSTIC DILATATION OF THE COMMON BILE DUCT.

(Eng.) Matsumoto, Y.; Uchida, K.; Nakase, A.; Honjo, I. (Kyoto Univ. Medical Sch., Sakyo-Ku, Kyoto, Japan). *Am. J. Surg.* 134(5):569-574; 1977.

Congenital cystic dilatation of the common bile duct was classified in 103 patients with a localized dilatation of the biliary passages who were treated at the Kyoto University Medical Center between 1970 and 1975. Of the 103, 101 had congenital cystic dilatation of the common bile duct (Alonso-Lej type I). These dilatations were classified into two subtypes, "infant type" and "adult type," based on the anatomic location and clinical features. The infant type cyst was typically a large cyst of the choledochus and most common in infancy and childhood. The adult type cyst was a fusiform dilatation of the biliary tract, and most common in adults. Among the patients with the infant type cyst, six had a dilatation beginning in the intrapancreatic or retroduodenal portion of the common bile duct and ending below the level of the junction with the cystic duct, and seven had a dilatation rising as far as the common hepatic duct. Gallstones were present in four patients in the first category, and in one in the second category. Among the patients with the adult type cyst, 27 had dilatation involving the right and left hepatic ducts, and in 61 it involved the intrahepatic bile ducts together with the entire extrahepatic biliary system. Twenty-three patients in the first group had gallstones, and 47 in the second group had stones.

2475 THIN NEEDLE CHOLANGIOGRAPHY: EXPERIENCE WITH 50 PATIENTS. (Eng.) Goldstein, L. I.; Kadell, B. M.; Weiner, M. (Univ. California Los Angeles Center Health Sciences, Los Angeles, CA 90024). *Ann. Surg.* 186(5):602-606; 1977.

The diagnostic accuracy and safety of thin needle cholangiography (TNC) was assessed in 50 patients with obstructive jaundice or jaundice of obscure origin. TNC was performed using the Chiba needle. Obstructed ducts were successfully demonstrated in 100% of cases (29/29). Nonobstructed ducts were opacified in 12/21. Overall success was 82% (41/50). Two septic complications, which were documented by positive blood cultures for *Escherichia coli*, occurred. It is concluded that TNC is a highly reliable, easy, and safe procedure in the evaluation of the jaundiced patient. Accurate demonstration of the biliary anatomy by TNC provided important information that in 20% of all cases led to a change in diagnosis, avoidance of unnecessary procedures, and shortening of hospitalization. Failure to visualize nondilated biliary ducts occurred with advanced chronic liver disease or fatty liver.

2476 SURGICAL JAUNDICE IN INFANCY. (Eng.) Lilly, J. R. (Univ. Colorado Sch. Medicine, 4200 E. Ninth Ave., Denver, CO 80262). *Ann. Surg.* 186(5):549-558; 1977.

Surgical progress in the treatment of congenital malformations of the biliary system is reviewed. Kasai's hepatic portoenterostomy operation for biliary atresia is a most dramatic example of the revolutionary changes that this type of surgery has undergone in the last decade. Radical departures from conventional surgical treatment also have been advocated for choledochal cyst, Caroli's disease, congenital perforation of the bile ducts, and biliary hypoplasia. The lesions responsible for obstructive jaundice in the early months of life include biliary atresia, biliary hypoplasia, choledochal cyst, congenital dilatation of the intrahepatic bile ducts (Caroli's disease), inspissated bile plug, and congenital common bile duct perforation. In "correctable" biliary atresia (i.e., where the proximal bile ducts are patent but end blindly before the duodenum), the Roux-en-Y choledochojejunostomy is advocated, while the Kasai procedure is used in situations where the lumina of the ducts are obliterated. In biliary hypoplasia, hepatic portoenterostomy is recommended. Roux-en-Y choledochojejunostomy may be used in choledochal cyst and Caroli's disease. Simple peritoneal drainage and cholecystostomy are advocated in congenital common bile duct perforation.

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E. L.; Trotman, B. W. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA). *Gastroenterology* 73(5):1247; 1977.

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See also, 1935, 2003, 2011, 2012, 2013, 2014, 2022, 2023, 2024, 2028, 2029, 2030, 2032, 2047, 2117, 2128, 2306, 2330, 2336, 2423, 2542, 2544, 2585, 2588.

GENERAL

2541 **GASTROINTESTINAL COMPLICATIONS AFTER RENAL TRANSPLANTATION.** (Eng.) Rosekrans, P. (Ikazia Hosp., Rotterdam, Netherlands). *Radiol. Clin. (Basel)* 47(1):32-43; 1978.

A total of 32 gastrointestinal complications were observed in 22 of 110 patients after renal transplantation. Gastrointestinal hemorrhage occurred in 12 patients, duodenal perforation in 1, *Candida* esophagitis in 6, severe hepatitis and liver failure in 8, pancreatitis in 2, abdominal fistulae and abscesses in 2, and ileus in 1. There were 9 fatalities as a result of these complications, and 7 of the deaths occurred among the 12 patients with severe gastrointestinal hemorrhage, as expressed by hematemesis and/or melena or bloody stools. Signs of liver failure were found in four patients with gastrointestinal hemorrhage; in three of these patients, this developed a few months after treatment of the bleeding, always after the development of Australia antigen-positive hepatitis. All three of these patients died, two in hepatic coma. The hepatitis B in these patients may have been the result of multiple blood transfusions received during the period of bleeding. Among the eight patients with severe hepatitis, four died in hepatic coma. Overall, upper gastrointestinal bleeding, particularly in combination with liver failure, was the principal cause of death in these patients. Two patients in this series were found to have malignancies, an adenocarcinoma of the stomach and a reticulum cell sarcoma localized in the brain and in the patient's own right kidney. These complications occurred 4 yr and 8 months, resp., after transplantation. The risk of solid tumor growth unmistakably increases as the time after transplantation increases.

2542 **EFFECTS OF ABDOMINAL SURGERY ON THE DEVELOPMENT OF RADIATION ENTEROPATHY.** (Eng.) LoIudice, T.; Baxter, D.; Balint, J. (Albany Medical Center Hosp., Albany, NY 12208). *Gastroenterology* 73(5):1093-1097; 1977.

A controlled, retrospective study of 105 patients was undertaken to ascertain whether or not abdominal surgery at any time before radiation therapy might result in an increased incidence of radiation enteropathy. Three groups of patients were studied; 24 had radiation enteropathy that developed an average of 12.5 months after radiation therapy, and 28 were matched controls without this complication. The records of a further group of 53 unmatched controls, who survived more than 2 yr after irradiation were also examined. In the group with radiation enteropathy, 18 (75%) had a history of prior surgery, whereas only 3 (10.7%) of the matched controls had been operated before irradiation ($\chi^2=3.52$, $p<0.005$). The incidence of prior surgery in the unmatched control group was 13.2%. These data indicate that abdominal surgery before radiotherapy does increase the risk of subsequent development of radiation enteropathy.

2543 **FECAL LEUKOCYTES IN ENTERIC INFECTIONS.** (Eng.) Pickering, L. K.; DuPont, H. L.; Olarte, J.; Conklin, R.; Ericsson, C. (6400 W. Cullen St., Houston, TX 77030). *Am. J. Clin. Pathol.* 68(5):562-565; 1977.

The value of the examination of stools for WBC as a diagnostic tool in enteric infections was examined. The feces of 90 adult and 200 pediatric patients were examined for the presence of fecal WBC and enteric pathogens during episodes of acute diarrhea. Fecal WBC were demonstrated in specimens from 24 of 35 patients with diarrheal stools from which a *Shigella* strain was isolated, and in 4 of 11 specimens from patients with stools from which *Salmonella* was isolated. A significantly ($p<0.001$) greater number of patients with *Shigella* isolated from their stools had fecal WBC when compared with 27 of 158 patients from whose stools no pathogen was isolated or to 8 of 56 patients from whose stools other bacterial and protozoal pathogens were isolated ($p<0.05$). An invasive bacterial strain was isolated from the stools of 18 patients, as determined by guinea pig eye testing. Eleven of 13 invasive *Shigella* isolates were associated with numerous fecal WBC, while none of five other invasive bacteria were related to WBC-positive stools. WBC were rarely found in the stools of patients with diarrhea thought to be due to viruses (2/36), *Giardia lamblia* (0/6), *Entamoeba histolytica* (0/4), or toxigenic *Escherichia coli* (4/35). The lack of total correlation between the presence of WBC and recovery of an invasive pathogen reflects the complex interaction of enteric pathogens with their hosts.

2544 USE OF AN ELEMENTAL DIET (VIVONEX) IN THE MANAGEMENT OF BILE ACID-INDUCED DIARRHOEA.

(Eng.) Nelson, L. M.; Carmichael, H. A.; Russell, R. I.; Atherton, S. T. (Royal Infirmary, Glasgow G4 OSF, Scotland). *Gut* 18(10): 792-794; 1977.

The effect of a low-fat containing elemental diet (Vivonex) on fecal bile acid excretion was studied in six patients with cholerheic diarrhea, two normal controls, and four patients with noncholerheic diarrhea. The total fecal bile acid excretion in the patients with bile acid-induced diarrhea was significantly reduced from 6.37 ± 1.64 mmol/24 hr to 2.70 ± 1.12 mmol/24 hr during Vivonex treatment ($p<0.05$). A marked improvement in the diarrhea of these patients occurred; the number of stools per day decreased, and there was less urgency associated with the diarrhea. No significant reduction in fecal bile acid excretion was observed for the control and noncholerheic diarrhea groups. A low-fat elemental diet may be valuable in the management of patients with bile acid-induced diarrhea unresponsive to other forms of therapy, and may be of particular value in patients with Crohn's disease.

2545 EXPERIMENTAL DIARRHOEA IN HUMAN VOLUNTEERS FOLLOWING ORAL ADMINISTRATION OF Clostridium perfringens ENTEROTOXIN.

(Eng.) Skjelkvale, R.; Uemura, T. (Norwegian Food Res. Inst., P.O. Box 50 N-1432 As-NLH, Norway). *J. Appl. Bacteriol.* 43(2): 281-286; 1977.

Experimental diarrhea was produced in human volunteers by the administration of *Clostridium perfringens* enterotoxin in an effort to study the following questions: (a) the amount of enterotoxin needed to produce diarrhea, (b) the enterotoxin level in fecal samples after acute diarrhea, (c) changes in serum anti-enterotoxin titers after experimental diarrhea, and (d) the role of anti-enterotoxin in the prevention of diarrhea in enterotoxin-exposed subjects. The p.o. administration of purified enterotoxin to the volunteers provoked diarrhea and abdominal pain. Diarrhea occurred in one of two volunteers who received 8 mg of enterotoxin. All of five subjects given 10 and 12 mg of purified enterotoxin or crude enterotoxin developed symptoms. Passive hemagglutination anti-enterotoxin titers in serum increased in only five of nine volunteers after exposure to enterotoxin. As such levels of anti-enterotoxin can be detected in normal serum samples, titration of anti-enterotoxin may be of little use in diagnosing *C. perfringens* food poisoning. Enterotoxin was detected in all diarrheal fecal specimens, and the enterotoxin level varied from 0.2-16 μg/g. The detection of enterotoxin in diarrheal feces may be the most reliable diagnostic procedure in outbreaks of *C. perfringens* food poisoning.

2546 DOGMA AND DERMATITIS HERPETIFORMIS. (Eng.)

Marks, J. M. (Royal Victoria Infirmary, Queen Victoria Rd., Newcastle upon Tyne NEI 4LP, England). *Clin. Exp. Dermatol.* 2(9):189-207; 1977.

Data from 120 patients with dermatitis herpetiformis (DH) seen in a 10-yr period were reviewed with reference to new discoveries in the field to demonstrate how the concept of DH has altered during the last decade. In these patients, the final diagnosis of DH was made from an overall impression, which took into account clinical symptoms, therapeutic response, histological examination, and the results of special tests. Dapsone response was essential for differentiation of DH from diseases not of the DH/pemphigoid group. The IgA test was performed on clinically uninvolved skin; IgA deposits were found in 53 of 55 patients. This test is a good screening procedure, but it should be used in conjunction with other diagnostic criteria. Some anomalies of the IgA test occurred, but their significance was uncertain. It is not known whether the enteropathy found in some patients with DH was celiac disease (CD). To answer this question more precise definition of CD is necessary.

2547 VITAMIN B_{12} ABSORPTION DETERMINED WITH A DOUBLE ISOTOPE TECHNIQUE EMPLOYING INCOMPLETE STOOL COLLECTION: RELIABILITY AND VALIDITY IN PERNICIOUS ANEMIA.

(Eng.) Hjelt, K.; Munck, O.; Hippe, E.; Barenholdt, O. (Glostrup Hosp., Glostrup, Denmark). *Acta Med. Scand.* 202(5):419-422; 1977.

To evaluate the reliability of the vitamin B_{12} absorption test, the vitamin B_{12} (B_{12}) absorption was determined simultaneously with whole-body counting (FRB_{12}) and with a double isotope technique employing incomplete stool collection (FAB_{12}) in 19 control patients and 10 patients with pernicious anemia (PA). The test dose was administered p.o. and consisted of 8 ml of a 10 ml solution containing 0.5 μg of $^{58}Co\text{-}B_{12}$ (0.4 μCi) and 2 mg of $^{51}CrCl_3$ (20 μCi). Two milliliters of the solution were used as the standard. To permit following of the passage of the inabsorbable tracer ($^{51}CrCl_3$), 25 radiopaque pellets and 4 carmine tablets (2 g) were administered to the patients immediately after the test dose. Counting of a 3-4 ml specimen from one of the first two red stools was sufficient for calculation of FAB_{12}. The findings correlated closely with the FRB_{12} values ($r=0.99$, $N=39$, $p<0.001$). In the control subjects, the FAB_{12} averaged 74% (range 37-88). In the patients with PA given intrinsic factor (IF), the FAB_{12} averaged 40% (range 22-59). When IF was not given, FAB_{12} averaged 2% (range 0-9). The test, therefore, is a valid indicator of pernicious anemia. For the mean value of 74%, the standard deviation (S.D.) was 5%, corresponding to a coefficient of variation (CV) of 7%. In the patients not given IF, S.D. was 1% and CV 50%, and in those given IF, S.D. was 8% and CV 20%. These results demonstrate that the test is as reliable as whole-body counting. Carmine tablets proved to be a good indicator of isotope-containing stool. The test is easy to perform and requires only a scintillation well-counter. No cooperation on the part of the patients is necessary. The test is also suitable for outpatients. Furthermore, it is independent of kidney function, and flushing with B_{12} is avoided.

2548 UNUSUAL AMYLOID BODIES IN HUMAN LIVER: ULTRASTRUCTURAL AND FREEZE-ETCHING STUDIES. (Eng.) Livni, N.; Behar, A. J.; Lafair, J. S. (Hebrew Univ.-Hadassah Medical Sch., Jerusalem, Israel). *Isr. J. Med. Sci.* 13(12):1163-1170; 1977.

An unusual presentation of amyloidosis in the liver is described in two patients with chronic, nonspecific pulmonary disease. Amyloid bodies, ranging from 3 to 20 μm in diameter and staining positive for Congo red, were found to be deposited between or within hepatocytes and, therefore, to be in a more direct spatial relationship to epithelial than to Kupffer or sinusoidal lining cells. The freeze-etching technique revealed that the average diameter of the amyloid fibrils was 15 nm and not 7 to 10 nm; this may have been due to the fact that this technique avoids shrinkage artifacts that follow fixation and dehydration. These observations suggest a possible role of parenchymal tissues in the formation of amyloid material.

2549 IMPROVED MICELLAR DISPERSAL OF DIETARY LIPID BY BILE ACIDS DURING REPLACEMENT THERAPY IN GROWTH HORMONE-DEFICIENT CHILDREN. (Eng.) Poley, J. R.; Smith, J. D.; Thompson, J. B.; Seely, J. R. (Kinderklinik der Universitat Ulm, Prittwitzstrasse 43, 7900 Ulm, Donau, W. Germany). *Pediatr. Res.* 11(12):1186-1191; 1977.

To determine whether human growth hormone (hGH) influences digestive processes in man, the composition of the aqueous (micellar) phase was studied during the digestion of two consecutive meals in five growth hormone-deficient individuals and in three controls, before and after replacement therapy with hGH. Before treatment, the average micellar bile acid concentration in the hGH-deficient individuals was 5.0 ± 0.6 mM (normal controls 6-15 mM) during the first meal, and 3.5 ± 0.9 mM (normal controls 5-10 mM) during the second meal. After 1 yr of treatment with hGH (2 U 3x/week for 10 days, thereafter 3 U/week), the mean micellar bile acid concentration increased to 9.7 ± 1.0 mM ($p<0.02$) during the first, and to 7.1 ± 0.3 mM ($p<0.01$) during the second meal. The micellar lipid concentration increased concomitantly with an increased micellar bile acid concentration (fatty acid: first meal 6.3 ± 0.6 mM to 13.0 ± 0.7 mM, $p<0.001$; second meal 4.5 ± 1.5 mM to 8.5 ± 0.3 mM, $p<0.05$; monoglyceride, as percentage of total fatty acids: first meal 25 ± 10 to 53 ± 7, $p<0.02$; second meal 31 ± 7 to 62 ± 6, $p<0.02$). Short-term treatment (10 days) of the controls did not affect the concentration of micellar bile acids and lipids. There was no significant difference in the physical state of bile acids and lipids between patients and control subjects before and after treatment.

2550 SERUM ALBUMIN LEVELS IN PATIENTS WITH THE ZOLLINGER-ELLISON SYNDROME. (Eng.) Lamers, C. B. H.; Hafkenscheid, J. C. M.; Yap, S. H.; van Tongeren, J. H. M. (Univ. Hosp. St. Radboud, Nijmegen, Netherlands). *Gastroenterology* 73(5):975-979; 1977.

The serum albumin concentrations in patients with the Zollinger-Ellison (ZE) syndrome were compared with the levels in normal controls and in patients with duodenal or stomal ulcers. Serum albumin concentrations in 20 patients with proved or presumed ZE syndrome (4.1 ± 0.8 g/100 ml) were significantly ($p<0.01$) lower than the levels observed in 40 normal controls (5.1 ± 0.3 g/100 ml), 40 duodenal ulcer patients (5.1 ± 0.4 g/100 ml), and 20 stomal ulcer patients (5.1 ± 0.3 g/100 ml). Six ZE patients with metastatic gastrinoma had slightly lower ($p<0.10$) serum albumin concentrations (3.5 ± 0.9 g/100 ml) than did 14 ZE patients without evidence of metastatic lesions (4.3 ± 0.7 g/100 ml). In a small group of patients studied more extensively, the mechanism of hypoalbuminemia was found to be complex. In addition to metastatic tumor growth, both gastrointestinal protein loss and impaired albumin synthesis may be factors in the pathogenesis of hypoalbuminemia. Inadequate nutrition was only evident in one patient with esophageal stricture and in two patients with extensive tumor growth after total gastrectomy. Total gastrectomy induced a rise in serum albumin in all eight patients studied ($p=0.01$). It is concluded that low serum albumin concentrations in peptic ulcer patients may be a clue to the diagnosis of ZE syndrome.

2551 POSSIBILITIES OF THE SURGICAL MANAGEMENT OF HEMORRHAGES OF THE UPPER GASTROINTESTINAL TRACT. (Fle.) Eyskens, E. (St. Vincentius Ziekenhuis, Universitaire Instelling Antwerpen, Universiteitsplein 1, B-2610 Wilrijk, Belgium). *Tijdschr. Gastroenterol.* 19(5):347-359; 1976.

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2613 SPECIFIC ANTI-E. coli BOVINE MILK IMMUNOGLOBULINS IN THE TREATMENT OF INFANTS WITH INTESTINAL E. coli INFECTIONS [Abstract]. (Eng.) Ballabriga, A.; Farriaux, J. P.; Hilpert, H.; Gerber, H.; Arcalis, L. (No affiliation given). *Acta Paediatr. Belg.* 29(2):126; 1976.

2614 GASTRO-INTESTINAL PASSAGE OF BOVINE ANTI-E. coli MILK ANTIBODIES IN HUMAN INFANTS [Abstract]. (Eng.) Hilpert, H.; Gerber, H.; De Peyer, E.; Nussle, D. (No affiliation given). *Acta Paediatr. Belg.* 29(2):125-126; 1976.

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GENERAL

Parasitology

2615 HEPATIC AMEBIASIS, ANALYSIS OF 56 CASES. I. CLINICAL FINDINGS. (Eng.) Carneiro Chaves, F. J. Z.; Cruz, I.; Gomes, C.; Domingues, W.; Marques Da Silva, E.; Tavarela Veloso, F. (Hosp. de S. Joao, Porto, Portugal). *Am. J. Gastroenterol.* 68(2):134-140; 1977.

Clinical findings in 56 patients with hepatic amebiasis are reviewed. The clinical picture was dominated by abdominal pain (96.4%) localized in the right hypochondrium in 90.7% of the cases, fever (71.4%), anorexia (53.5%), weight loss (50%), tender hepatomegaly (85.7%), pain on percussion of the right hypochondrium (81.5%), and auscultatory abnormalities in the lower right lung field (71.4%). Mucosal edema (28.9%) and a granulated mucosa (28.9%) were the most frequent rectosigmoidoscopic findings in the 38 patients examined. Liver puncture biopsy and aspiration of abscesses were performed in 16 patients, and characteristic pus resembling anchovy sauce was obtained in 87.5% of these patients. Mild jaundice was observed in 35.7% of the patients and appeared to have no prognostic significance. The illness was most frequent in black men between the ages of 20 and 39 yr; 89.3% of the patients were men, 75% were black, and 70.9% were between 20 and 39 yr of age. Metronidazol (250 mg, p.o., for 10 days) was used to treat 15 patients; dehydroemetine (1 mg/kg, i.m., for 10 days) and tetracycline (1-2 g, p.o., for 14 days) were used to treat 31 patients; and chloroquine (750 mg/day, p.o., for 4-6 weeks) was given to 10 patients. Surgical intervention was necessary only when complications were present; however, even in a patient with a bronchohepatic fistula, complete recovery followed chemotherapy. Other, rarer complications, such as rupture into adjacent abdominal viscus, the pericardium, or the skin, were not observed.

2616 MASSIVE INFECTION WITH Fasciola hepatica IN MAN. (Eng.) Jones, E. A.; Kay, J. M.; Milligan, H. P.; Owens, D. (Natl. Inst. Arthritis, Metabolism, and Digestive Diseases, Natl. Inst. Health, Bethesda, MD 20014). *Am. J. Med.* 63(5):836-842; 1977.

The 6-yr clinical course of a patient who acquired a massive *Fasciola hepatica* infection is described. A peripheral blood eosinophilia was an almost constant finding throughout the illness. The patient may have been infected with a multiple of 40 adult flukes, as his fecal ova count (1,000/g) was 40 times greater than that of a subject with an asymptomatic infection. During the illness, cholecystectomy was carried out. The surface of the liver was studded with greyish white hard nodules. Histologically, there was a nonspecific chronic cholecystitis; a liver biopsy disclosed florid changes of large duct, biliary obstruction, granulomas, patchy periductular fibrosis, and an ovum morphologically similar to an ovum of *F. hepatica* surrounded by a granuloma. Three exacerbations of symptoms were associated with severe microcytic hypochromic anemia, possibly due to blood loss into the biliary tract. A course of bithionol was associated with rapid amelioration of symptoms and disappearance of ova from feces. No evidence of recurrence occurred during the following 2.5 yr. The infection was probably acquired by eating wild watercress containing encysted metacercariae. At a campsite frequented by the patient, a habitat suitable for the life cycle of *F. hepatica* was found, including snails of the genus *Limnaea truncatula,* which were shown to contain cercariae. The site is in a region with a high rainfall, a factor known to favor the life cycle of *F. hepatica.* Infection with this parasite should be considered whenever a clinical picture suggestive of biliary tract disease is associated with an eosinophilia.

2617 QUANTIFICATION OF THE LYMPHOCYTIC INFILTRATE IN JEJUNAL EPITHELIUM IN GIARDIASIS. (Eng.) Wright, S. G.; Tomkins, A. M. (Hosp. Tropical Diseases, St. Pancras Way, London NW1, England). *Clin. Exp. Immunol.* 29(3):408-412; 1977.

To determine if there is an increased number of intraepithelial lymphocytes in the jejunum of patients with giardiasis, these cells were counted in coded serial sections of both normal jejunum and jejunum from 40 patients with giardiasis. Patients with giardiasis and normal intestinal absorption and control patients who had lived and traveled in tropical areas had similar counts, which were higher than those reported for controls from temperate areas. Where giardiasis was accompanied by malabsorption of one substance, the mean count was significantly higher than that of controls ($p<0.02$). In those patients with giardiasis and malabsorption of two or three substances, the mean count was significantly higher than that of controls ($p<0.02$) and that of patients with giardiasis and normal absorption ($p<0.05$). After treatment, intraepithelial lymphocyte counts declined consistently in patients with malabsorption. There appears to be an association between raised intraepithelial lymphocyte counts and malabsorption.

2618 A STRANGE CASE OF ASTHENIA DUE TO THERAPY ON THE BASIS OF ERRONEOUS DIAGNOSIS IN A PATIENT WITH SCHISTOSOMIASIS. (Fre.) Simitzis-Le-Flohic, A. M.; Chastel, Cl.; Le Roy, J. P.; Mottier, D.; Bercovici, J. P. (Laboratoire de Bacteriologie-Virologie-Parasitologie, Faculte de Medecine, B.P. 815, 29279 Brest Cedex, France). *Sem. Hop. Paris* 53(22/23):1369-1370; 1977.

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2622 EPIDEMIOLOGICAL ANALYSIS OF OCCURRENCE OF HUMAN TAPEWORMS IN THE SLOVAK SOCIALIST REPUBLIC IN 1971-1974. (Cze.) Straka, S.; Sobota, K.; Beniat, T.; Giboda, M.; Kubicova, E. (Katedra Hygieny, Epidemiologie, Mikrobiologie a Socialneho Lakarstva, Lekarstkej Fakulty UK, Martin, Czechoslovakia). *Cesk. Epidemiol. Mikrobiol. Immunol.* 26(1):52-60; 1977.

See also, 1702, 1987, 1997, 2010, 2025, 2026, 2027, 2036, 2352, 2541, 2543.

GENERAL

Regional Enteritis

2623 ^{14}C-GLYCOCHOLATE TEST IN CROHN'S DISEASE--ITS VALUE IN ASSESSMENT AND TREATMENT. (Eng.) Scarpello, J. H. B.; Sladen, G. E. (Royal Hosp., West St., Sheffield, England). *Gut* 18(9): 736-741; 1977.

The ^{14}C-glycocholic acid (^{14}C-GCA) test was assessed in 27 patients who had resection of the ileum and colon for Crohn's disease and in 19 patients with unoperated stable Crohn's disease. The incidence of increased breath output of $^{14}CO_2$ and fecal output of ^{14}C was significantly greater in operated patients. Six operated patients had increased breath output alone, 8 had increased fecal output alone, and 12 had increased fecal and breath output, whereas the respective figures in 13 nonoperated patients were 2, 7, and 0. Half the unoperated patients had normal results and, of the others, a modest increase in fecal ^{14}C was the usual finding. There was no correlation between the ^{14}C-GCA test, the Schilling test, and the extent and severity of the radiological signs in the unoperated patients. Metronidazole therapy was poorly tolerated and had little or no influence on symptoms but did decrease the excretion of $^{14}CO_2$ in the breath when the ^{14}C-GCA test was repeated. Cholestyramine therapy was beneficial in the majority of resected patients with diarrhea and an increased fecal ^{14}C excretion, and, on repeat testing, there was a significant increase in the output of breath $^{14}CO_2$. The beneficial effect was less marked in the unoperated patients, and the breath $^{14}CO_2$ output remained normal in those retested. Interruption of the enterohepatic circulation of bile acids did not seem to make an important contribution to the symptoms of patients with stable unoperated (and uncomplicated) Crohn's disease, even when the ileum was extensively involved.

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2627 PYLORIC STENOSIS IN CROHN'S DISEASE. (Ger.) Meissner, H. J. (Kliniken der Freien Hansestadt Bremen, Kirchbachstrasse 97, D-2800 Bremen, W. Germany). *Zentralbl. Chir.* 102 (14):886-888; 1977.

2628 PARENTERAL FEEDING AND ELEMENTAL ENTERAL FEEDING IN THE TREATMENT OF CROHN'S DISEASE AND ULCERATIVE COLITIS IN CHILDREN. (Fre.) Ricour, C.; Duhamel, J. F.; Nihoul-Fekete, C. (Hopital des Enfants-Malades, 149, rue de Sevres, 75730 Paris, Cedex 15, France). *Arch. Fr. Pediatr.* 34(6):505-513; 1977.

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2205*
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1776
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2251
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1806*
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2422
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1960
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2357
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2083, 2092
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2262
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1963, 2009
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KURBANOV, M.K.
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2438
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1941, 1942
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SAEZ-ALQUEZAR, A.
2010
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1986*
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1706*
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3

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

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The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *International Standard ISO833, 1974*, are used. The two-letter state abbreviations are based on the United States Postal Service Code.

LANGUAGE ABBREVIATIONS

Afrikaans	Afr.
Albanian	Alb.
Arabic	Ara.
Armenian	Arm.
Azerbaijani	Aze.
Belorussian	Bel.
Bengali	Ben.
Bulgarian	Bul.
Burmese	Bur.
Chinese	Chi.
Croatian	Cro.
Czechoslovakian	Cze.
Danish	Dan.
Dutch	Dut.
English	Eng.
Esperanto	Esp.
Estonian	Est.
Finnish	Fin.
Flemish	Fle.
French	Fre.
Gaelic	Gae.
Georgian	Geo.
German	Ger.
Greek	Gre.
Hausa	Hau.
Hebrew	Heb.
Hindi	Hin.
Hungarian	Hun.
Icelandic	Ice.
Indonesian	Ind.
Interlingua	Int.
Italian	Ita.
Japanese	Jpn.
Kirghiz	Kir.
Korean	Kor.
Latin	Lat.
Latvian	Lav.
Lithuanian	Lit.
Marathi	Mar.
Masai	Mas.
Multilingual	Mlt.
Norwegian	Nor.
Persian	Per.
Polish	Pol.
Portuguese	Por.
Pushto	Pus.
Rumanian	Rum.
Russian	Rus.
Serbian	Ser.
Slovak	Slo.
Slovene	Slv.
Spanish	Spa.
Swahili	Swa.
Swedish	Swe.
Tagalog	Tag.
Tamil	Tam.
Telugu	Tel.
Thai	Tha.
Turkish	Tur.
Ukranian	Ukr.
Urdu	Urd.
Vietnamese	Vie.
Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone
ADP	adenosine diphosphate
AMP	adenosine monophosphate
amp	ampere
ATP	adenosine triphosphate
A	angstrom
BSP	sulfobromophthalein
C	degrees centigrade
cal	calories
cc	cubic centimeter
cm	centimeter(s)
dl	deciliter
DNA	deoxyribonucleic acid
ED_{50}	median effective dose(s)
EDTA	ethylenediamine tetraacetic acid
e.g.	for example
EEG	electroencephalogram
ESR	erythrocyte sedimentation rate
g	gram(s)
μg	microgram(s)
Hz	Hertz
hr	hour(s)
Ig	immunoglobulin(s)
i.m.	intramuscular
i.p.	intraperitoneal
IU	international unit(s)
i.v.	intravenous
kcal	kilocalorie(s)
kg	kilogram(s)
K_m	Michaelis constant
LD_{50}	median lethal dose(s)
LDH	lactic acid dehydrogenase
m	meter(s)
M	molar; mole(s)
mM	millimolar; millimole(s)
μM	micromolar; micromole(s)
ma	milliampere(s)
mCi, μCi	milli-, microcurie(s)
mEq	milliequivalent(s)
mg	milligram(s)
ml, μl	milli-, microliter(s)
mm	millimeter(s)
mOsm	milliosmolar; milliosmeter(s)
msec	millisecond(s)
mV	millivolt(s)
min	minute(s)
MTD	maximum tolerated dose
NAD	nicotinamide adenine dinucleotide
NADH	reduced nicotinamide adenine dinucleotide
NADP	nicotinamide adenine dinucleotidephosphate
NADPH	reduced nicotinamide adenine dinucleotidephosphate
ng	nanogram (10^{-9})
nm	nanometer(s)
Pa	ambient pressure
PAS	periodic acid - Schiff
pg	picogram (10^{-12})
pgEq	picogram equivalent(s)
p.o.	orally
ppb	parts per billion
ppm	parts per million
r	Roentgen
RBC	red blood cells (erythrocytes), red blood count
resp.	respectively
RNA	ribonucleic acid
s.c.	subcutaneous
sec	second(s)
SGOT	serum glutamic-oxalacetic transaminase
SGPT	serum glutamic-pyruvic transaminase
U	unit(s)
UV	ultraviolet
V	volt
WBC	white blood cells (leukocytes), white blood count
yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

2629 ESTIMATION AND CHARACTERIZATION OF PROSTAGLANDINS IN THE HUMAN GASTROINTESTINAL TRACT. (Eng.) Bennett, A.; Stamford, I. F.; Stockley, H. L. (King's Coll. Medical Sch., Denmark Hill, London SE5 8RX, England). *Br. J. Pharmacol.* 61(4): 579-586; 1977.

To characterize the prostaglandin extracted from muscle and mucosa of various regions of the human gut, and to study prostaglandin synthetase extracted from colonic mucosa, prostaglandin-like material was extracted from muscle and mucosa of surgically removed human tissues and assayed against prostaglandin E_2 on strips of rat gastric fundus. Superfused human isolated gastric mucosa released prostaglandin-like material, and release was increased by stretching or clamping the tissue. The relative amounts of extracted biological activity were noted broadly as follows: gastric antral mucosa>colon muscle>gastric body mucosa≃ileal mucosa>colon mucosa≃gastric muscle≃ ileal muscle. Prostaglandins E and F were tentatively identified by chromatography and sensitivity to inactivation by alkali. Prostaglandin E apparently contributed most to the biological activity, possibly because the assay tissue is more sensitive to prostaglandin E than to F. Chromatography of gastric body mucosal extracts located material running with prostaglandin E_2 and a little with E_1. Colonic muscle and mucosal extracts contained material with relative front (R_F) values of prostaglandin E_1, E_2, E_3, and $F_{1\alpha}$, whereas $F_{2\alpha}$- and $F_{3\alpha}$-like substances were found only in the mucosa. The proportion of prostaglandin F varied from one specimen to another. The amount of extracted prostaglandin-like activity was increased by adding cofactors and arachidonic acid, and decreased by homogenization with acid-ethanol. The type and amount of activity generated from arachidonic acid by partly purified colonic mucosal prostaglandin synthetase depended on the substrate concentration.

2630 EFFECT OF CHRONIC ETHANOL INGESTION ON THE SMALL INTESTINAL ULTRASTRUCTURE IN RATS. (Eng.) Rossi, M. A.; Zucoloto, S. (Medical Sch. Ribeirao Preto, 14100, Ribeirao Preto, Sao Paulo, Brazil). *Beitr. Pathol.* 161(1):50-61; 1977.

The effect of chronic ethanol ingestion on small intestinal ultrastructure was studied in male Wistar rats. Rats maintained for 16 weeks on a supplemented solid semisynthetic diet plus ethanol, corresponding to 35% of the total caloric intake, developed ultrastructural changes in the small intestine as compared to pair-fed controls. The enterocytes from jejunal and ileal villi of the alcoholic animals exhibited conspicuous alterations of the mitochondria and both smooth and rough endoplasmic reticulum. The mitochondrial changes were characterized by enlargement, swelling, decreased matrical density, ruptured cristae, and occasional myelin figures. The smooth endoplasmic reticulum was dilated and apparently proliferated in a few epithelial cells. The rough endoplasmic reticulum appeared scarce, with fewer ribosomes attached to the cisternae. These findings provide further evidence that chronic ethanol consumption is important in the pathogenesis of small intestinal damage in rats. These changes could be responsible, at least in part, for the functional abnormalities commonly found in chronic alcoholism.

2631 INTESTINAL MUCOSAL CHANGES FOLLOWING INDUCED HYPOTHYROIDISM IN THE DEVELOPING RAT. (Eng.) Blanes, A.; Martinez, A.; Bujan, J.; Junquera, S. R. C.; Carballido, S. M. (Departamento de Anatomia Patologica del Hospital Clinico de S. Carlos, Universidad Complutense, Madrid, Spain). *Virchows Arch. [Pathol. Anat.]* 375(3):233-239; 1977.

Morphological changes in the small intestine were studied in neonatal, hypothyroid rats. Hypothyroidism was induced during the first 24 hr postnatally in Wistar rats by the injection of radioiodine (100 μCi, i.p.). Samples from duodenojejunal and ileocecal junctions were taken, and histologic, histomorphometric, and ultrastructural studies were carried out. The most prominent feature was the decrease of the villous height and total mucosal thickness in the hypothyroid animals in comparison with controls. At the electron microscopic level, the microvillous height was also markedly decreased. These changes probably represent a direct effect of hormonal deprivation upon the intestinal mucosa, combined with the effect that hypothyroidism may have on the villi.

2632 ULTRASTRUCTURAL EFFECTS OF PARACHLOROPHENYLALANINE, 5-HYDROXYTRYPTAMINE AND THE IMIPRAMINE GROUP ON THE NERVE PROCESSES OF THE SMALL INTESTINE. (Eng.) Feher, E.; Csanyi, K. (Semmelweis Univ. Medical Sch., Budapest, Hungary). *Acta Anat.* 100(1):61-67; 1978.

The structure of the nerve fibers in the isolated cat ileum was studied by fluorescence and electron microscopy after intraluminal treatment with imipramine group compounds, parachlorophenylalanine, and 5-hydroxytryptamine. Following treatment with parachlorophenylalanine (100 mg/kg/day, 5 days) and imipramine group compounds (30 mg/kg/day, 5 days), specific granules were selectively decreased ($p<0.001$) in number in the small intestinal nerve fibers. In concordance with ultrastructural observations, a marked diminution of fluorescence intensity was demonstrated in the small intestine. The number of the granular vesicles was significantly increased following 5-hydroxytryptamine treatment (500 mg/kg/day, as creatinine sulfate-H_2O complex, 5 days), and yellow fluorescent neurons and processes were observed in the myenteric and submucous plexuses. These observations demonstrate the serotoninergic nature of certain nerve fibers.

2633 CARCINOEMBRYONIC ANTIGEN (CEA) IN THE NORMAL HUMAN SMALL INTESTINE: A LIGHT AND ELECTRON MICROSCOPIC STUDY. (Eng.) Isaacson, P.; Judd, M. A. (General Hosp., Southampton, England). *Gut* 18(10):786-791; 1977.

To examine the localization of carcinoembryonic antigen (CEA) in the normal small intestine, an immunoperoxidase method was applied to formalin-fixed paraffin-embedded and glutaraldehyde-fixed resin-embedded sections of human small intestine. CEA was easily demonstrated coating the surface of the small intestine, lining the crypts, and in goblet cells, indicating its presence there in considerable concentration. At the ultrastructural level, CEA was localized in the glycocalyx and in mucin granules of goblet cells but not intracytoplasmically. The restriction of CEA staining to the goblet cells and the glycocalyx suggests that the glycocalyx, or part of it, may be derived from the goblet cell.

2634 DISTRIBUTION OF INTRINSIC FACTOR-VITAMIN B_{12} RECEPTORS IN HUMAN INTESTINE. (Eng.) Hagedorn, C. H.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Gastroenterology* 73(5):1019-1022; 1977.

A new rapid and accurate method for detecting vitamin B_{12}-intrinsic factor (IF-B_{12}) receptors is described, and this method was used to study the distribution of mucosal IF-B_{12} receptors in three human small intestines. A microfuge technique was used to detect the IF-B_{12} receptor; in this method, the sample was diluted after incubation, obviating washing, and multiple samples were processed at the same time. This technique was compared with the Millipore filter method, and a good correlation was observed; similar values for bound B_{12} were obtained, over a range of B_{12} concentrations, when the two techniques were used on identical samples. Using the new method, IF-B_{12} receptors in human intestine were found to be present in significant amounts in the entire distal three-fifths of intestine. Triokinase activity was absent in the distal two-fifths of intestine, and tryptophan oxygenase was present only in the distal one-sixth, or most terminal part of the ileum. These data suggest that (a) biochemical functions in the ileum have different anatomical distributions, (b) IF-B_{12} receptors correspond most closely with the accepted anatomical definitions of the ileum, and (c) vitamin B_{12} malabsorption seen in resection or disease of the terminal ileum may not be attributable solely to a deficiency of ileal receptors.

2635 AN ELECTRON MICROSCOPIC STUDY OF INTRA-EPITHELIAL LYMPHOCYTES IN HUMAN FETAL SMALL INTESTINE. (Eng.) Orlic, D.; Lev, R. (New York Medical Coll., Basic Science Bldg., Valhalla, NY 10595). *Lab. Invest.* 37(6):554-561; 1977.

To study intra-epithelial lymphocytes in the human fetal small intestine, small intestine was obtained from 8- to 20-week fetuses, and the tissues were examined by electron microscopy. Lymphocytes were present as isolated cells in the mucosal mesenchyme as early as the 8th week of intra-uterine life and were found, in increasing numbers, in the epithelium of specimens obtained from 11- to 20-week-old fetuses. All intra-epithelial lymphocytes were located in the lateral spaces between contiguous columnar cells. Some displayed cytoplasmic pseudopods and were thought to migrate within the extracellular spaces of the epithelial layer. Surface invaginations and cytoplasmic vesicles in fetal lymphocytes suggested that these cells were capable of pinocytotic activity. Intra-epithelial lymphocytes in fetal gut may be able to sample ingested foreign substances in swallowed amniotic fluid in a manner similar to that previously proposed for intra-epithelial lymphocytes in the ileum of young adult chickens.

2636 ULTRASTRUCTURAL IDENTIFICATION OF A NEW CELL TYPE--THE N-CELL AS THE SOURCE OF NEUROTENSIN IN THE GUT MUCOSA. (Eng.) Helmstaedter, V.; Feurle, G. E.; Forssmann, W. G. (Anatomisches Institut und Medizinische Poliklinik der Universitat Heidelberg, Heidelberg, W. Germany). *Cell Tissue Res.* 184(4):445-452; 1977.

Neurotensin cells were identified immunohistochemically and ultrastructurally by differential counting of endocrine cells in the small intestines of primates (*Tupaia belangeri*). Using light microscopy, the enterochromaffin (EC) cells were identified by the Masson-Fontana silver stain; with the same method the neurotensin cells were not stained. The other endocrine cells were quantified using the peroxidase-antiperoxidase stain with antisera against glucagon, somatostatin, cholecystokinin, gastrin, secretin, pancreatic polypeptide, gastric inhibitory peptide, and neurotensin. In the ileal mucosa, the most frequent endocrine cell was the EC cell, followed by the glucagonoid cell (L cell). The immunoreactive neurotensin cell was the third most frequent endocrine cell in this region. Ultrastructurally, this cell was found to contain electron dense secretory granules measuring 335 ± 87 nm in diameter.

2637 HISTOCHEMICAL AND ULTRASTRUCTURAL IDENTIFICATION OF NEUROTENSIN CELLS IN THE DOG ILEUM. (Eng.) Frigerio, B.; Ravazola, M.; Ito, S.; Buffa, R.; Capella, C.; Solcia, E.; Orci, L. (Histochemistry and Ultrastructure Center, Univ. Pavia at Varese, Viale L. Borri 57, I-21100 Varese, Italy). *Histochemistry* 54(2):123-131; 1977.

Neurotensin immunoreactive cells were investigated histochemically and ultrastructurally in the dog ileum, with special reference to their relation with other endocrine cells in the mucosa of the lower small intestine. Neurotensin cells that were stained with immunofluorescence or immunoperoxidase proved distinct from argentaffin (EC) cells, glucagon immunoreactive (GLI) cells, and pancreatic peptide immunoreactive (PP) cells. Neurotensin cells showed various degrees of reactivity with Grimelius silver. With electron microscopy, large granule cells with a thin peripheral rim of Grimelius-reactivity (L cells) and large granule cells with variable Grimelius-reactivity of the core (N cells) were found in addition to EC cells. On the basis of their distribution, L cells were identified with GLI cells, and N cells were interpreted to be neurotensin cells.

2638 ANATOMY AND RADIOLOGY OF THE AREAE GASTRICAE. (Eng.) Mackintosh, C. E.; Kreel, L. (Royal Free Hosp., Middlesex, England). *Gut* 18(11):855-864; 1977.

The anatomy and radiology of the areae gastricae were studied in human and pig stomach specimens to create a meaningful clinical picture of the anatomy of the gastric mucosa for the rational interpretation of the double-contrast barium meal. By coating isolated stomach sections with barium from a syringe, a barium groove pattern was observed that corresponded with the anatomical groove pattern in the human and pig. This pattern was distinctive in the anatomical antrum, body, and fundus of the stomach. The mosaic pattern in the antrum was relatively fine with a short distance between the grooves and, on occasion in the magnified image, there was an impression of a punctate pattern between the grooves themselves. In the anatomical body of the stomach containing the fundic glands, the grooves were much wider and further apart with a coarse mosaic quite different from the antral mucosa; a punctate pattern between the grooves was not clearly seen. The anatomical fundus had a groove pattern intermediate in coarseness between the antrum and body of the stomach. In 272 double-contrast barium meals in humans, the antral areae pattern was graded from 1-4, i.e., average distance between grooves 1, 2, 3, or 4 mm, with nonvisualization graded as 0. It was found that 35% of the duodenal ulcer cases had a grade 4 pattern in the antrum, and less than 3% of the duodenal ulcers occurred in the nonvisualized group. The inference is that the non-coater has a thick barrier mucus layer and a low duodenal ulcer incidence, that is in keeping with experimental work on rats showing that drugs that promote ulcer healing increase mucus secretion. It was also shown that the success of the barium coating to show the area gastricae depends on the type of barium used and the thickness of the barium coat itself in addition to the thickness of the mucus layer.

2639 MORPHOLOGICAL STUDY OF THE PANETH CELL: PANETH CELLS IN INTESTINAL METAPLASIA OF THE STOMACH AND DUODENUM OF MAN. (Eng.) Matsubara, F. (Yamaguchi Univ. Sch. Medicine, Kogushi, Ube, Yamaguchi Pref. 755, Japan). *Acta Pathol. Jpn.* 27(5):677-695; 1977.

To clarify the physiological significance of the Paneth cells, these cells were studied ultrastructurally in the duodenum and in intestinal metaplasia of stomach in 173 patients, and the fine structures of the cells were compared. Paneth cells showed the ultrastructure of serozymogenic cells and secreted their secretory granules by a merocrine process. Rod-shaped or tubular dense bodies were observed in the apical region of some Paneth cells, and these may have some relation to the secretion of the secretory granules. Secretory granules with a less dense layer in the periphery were also observed. Cells morphologically intermediate between the Paneth cell and the goblet cell were found. Some of the Paneth cells might be phagocytized by undifferentiated crypt cells. The Paneth cells in intestinal metaplasia were morphologically similar to those in duodenum. However, phagolysosomes in the lower cytoplasm were observed more frequently in the Paneth cells of the duodenum than in those found in gastric metaplasia.

2640 QUANTITATIVE ELECTRON MICROSCOPICAL STUDIES ON IN VITRO INCUBATED RABBIT GALLBLADDER EPITHELIUM. (Eng.) Blom, H.; Helander, H. F. (Dept. Anatomy, Univ. Umea, S-901 87 Umea, Sweden). *J. Membr. Biol.* 37(1):45-61; 1977.

Water and electrolyte transport were studied in pieces of rabbit gallbladder incubated *in vitro* for 1 hr in Ringer's solution at 37 C (transporting epithelium), or in Ringer's containing 1 mM ouabain (inhibited epithelium). The tissues were fixed in 2% glutaraldehyde, postfixed in OsO_4, and embedded in Epon. Stereological analysis was carried out on electron micrographs. In the transporting epithelium, the epithelial cell height averaged 28 μm in the crests and 18 μm in the crypts. The nucleus, mitochondria, paracellular channels, lateral plasma membrane, and apical membrane in the crests averaged 16.9% of cell volume, 18.7% of cytoplasmic volume, 28.3% of epithelial volume, 4.1 m^2/cm^3 of cell volume, and 0.5 m^2/cm^3 of cell volume, resp.; in the crypts, the corresponding figures were 18.7%, 14.1%, 11.0%, 2.9 m^2/cm^3, and 0.6 m^2/cm^3. The paracellular channels appeared as interconnected tissue sheets of varying width; they were broader in the basal portion of the epithelium than in the apical portion; however, immediately above the basement membrane the channels became very narrow. The arithmetic mean width of the channels was 0.9 and 0.2 μm in the crests and crypts, resp.; and their length was in the range of 40-120 μm. These stereological data are compatible with the standing gradient model for water transport. The ouabain-inhibited cells were swollen and had collapsed paracellular channels. Although it cannot be ruled out that volume changes occurred in the cells and the paracellular channels during the tissue processing, qualitatively similar morphology was observed by light microscopy of transporting and inhibited gallbladder epithelium fixed by freeze-drying and embedded in Epon. This indicates the presence of such channels in the *in vitro* transporting rabbit gallbladder epithelium.

2641 THE ULTRASTRUCTURE OF HUMAN CHOLANGIOLAR CELLS [Abstract]. (Eng.) Min, K. W.; Gyorkey, P.; Gyorkey, F. (Veterans Admin. Hosp., Houston, TX 77211). *Fed. Proc.* 37(3):303; 1978.

2642 ISOLATION AND IMMUNOHISTOCHEMICAL LOCALIZATION OF A COMPONENT OF BASEMENT MEMBRANE

COLLAGEN IN HUMAN LIVER [Abstract]. (Eng.) Biempica, L.; Morecki, R.; Wu, C. H.; Giambrone, M. A.; Rojkind, M. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 73(5):1213; 1977.

2643 THIRD DIVISION OF THE AUTONOMIC NERVOUS SYSTEM. AN IMPORTANT ELEMENT IN GUT CONTROL [Abstract]. (Eng.) Bishop, A. C.; Polak, J. M.; Buchan, A. M. J.; Bloom, S. R.; Pearse, A. G. E. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(11):A962-A963; 1977.

2644 TOTAL NUMBER OF GASTRIN CELLS IN THE NORMAL HUMAN STOMACH AND IN PEPTIC ULCER PATIENTS [Abstract]. (Eng.) Willems, G.; Keuppens, F. (Eenheid voor gastro-enterologisch Onderzoek, Vrije Universiteit, Brussels, Belgium). *Rend. Gastroenterol.* 9(1):59; 1977.

2645 RESOLVING BIOCHEMICALLY THE HEPATOCYTE'S MULTIFUNCTIONAL PERICELLULAR MEMBRANE. (Eng.) Evans, W. H. (Natl. Inst. Medical Res., Mill Hill, London, England). *Trends Biochem. Sci.* 2(8):169-171; 1977.

2646 MORPHOLOGICAL AND CYTOLOGICAL RESEARCH ON THE LIVER OF THE HUMAN EMBRYO AND FETUS [Abstract]. (Eng.) Batistic, B.; Velfl, D. (Medical Faculty, Rijeka, Yugoslavia). *Acta Anat. (Basel)* 99(1):87-88; 1977.

2647 HEPATIC FINE STRUCTURAL CHANGES IN AGING FISCHER 344 RATS [Abstract]. (Eng.) Schmucker, D. L.; Mooney, J. S.; Jones, A. L. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1127; 1977.

2648 THE BILE DUCTS. (Eng.) Menuck, L.; Amberg, J. (Veterans Admin. Hosp., La Jolla, CA). *Radiol. Clin. North Am.* 14(3):499-525; 1976.

See also, 2711, 2753, 2755, 2764, 2773, 2781, 2801, 2839, 2868, 2869, 2885, 2886, 2898, 2910, 2926, 2927, 2933, 2935, 2940, 3013, 3042, 3056, 3069, 3095, 3099, 3133, 3143, 3156, 3208, 3261, 3262, 3384.

ABSORPTION - EXCRETION - TRANSPORT

2649 ISOLATED MEMBRANE VESICLES AS TOOLS FOR ANALYSIS OF EPITHELIAL TRANSPORT. (Eng.) Hopfer, U. (Sch. Medicine, Case Western Reserve Univ., Cleveland, OH 44106). *Am. J. Physiol.* 233(6):E445-E449; 1977.

Vesicles of the isolated brush border and basolateral plasma membranes were used in studies of intestinal transport to provide information on mechanisms of solute translocation across both plasma membranes, coupling of Na$^+$ and nonelectrolyte transport in the brush border membrane, kinetics of the nonelectrolyte transport under controlled *cis* and *trans* conditions, and analysis of transport changes associated with different physiological or pathological conditions. The mechanisms of translocation of D-glucose and a neutral amino acid are presented as the examples of nonelectrolytic transport. It was found that Na$^+$ stimulated the transport of L-valine and D-glucose in brush border membranes. Further observations suggested that Na$^+$ is the only ion directly involved in nonelectrolyte transport. D-glucose translocations across the membrane fall into the category of "facilitated diffusion." The difference between the transport mechanisms in the brush border and the basolateral plasma membrane is the requirement for a cosubstrate in the former. The kinetic parameters of the Na$^+$-dependent glucose system, determined with an equilibrium exchange procedure, indicate that Na$^+$-glucose-loaded carrier has a significantly higher translocation rate than the carrier loaded only with D-glucose. Semistarvation of animals from which brush border membranes were isolated increased the activity of L-valine transport, which may explain the elevated amino acid transport seen in an intact epithelium. Semistarvation had no effect on the D-glucose transport rate. The experiments discussed illustrate that the advantage of the vesicular system preparations over preparations of intact intestinal cells or tissues is their ability to control the composition of the environment on both sides of the membrane and, thereby, the transmembrane gradients.

2650 EFFECT OF DAILY ETHANOL INGESTION ON INTESTINAL PERMEABILITY TO MACROMOLECULES. (Eng.) Worthington, B. S.; Meserole, L.; Syrotuck, J. A. (Nutrition Div., Univ. Washington, Child Development Mental Retardation Center, WJ-10, Seattle, WA 98195). *Am. J. Dig. Dis.* 23(1):23-32; 1978.

The effects of regular ethanol ingestion on morphological and permeability characteristics of the small intestine were assessed in mature female Sprague-Dawley rats. Thirty adult rats were divided into two groups and provided a standard commercial diet in pellet form. Each morning, after an overnight fast, every animal in the experimental group was administered an aliquot of 20% ethanol by gavage; animals in the control group were provided aliquots of 20% sucrose in water by the same method. After 4 and 8 weeks on the gavage routine (and 10 days and 4 weeks after gavage cessation), jejunal permeability to horseradish peroxidase was examined in animals from each group. Using a routine ligated-loop procedure and light and electron microscopy, ethanol-exposed rats demonstrated increased intestinal permeability to horseradish peroxidase by 4 weeks; sucrose-exposed animals revealed little alteration in mucosal integrity. It is proposed that regular ingestion of sizable amounts of alcohol alters morphological characteristics of the gut and increases the permeability of the mucosa to "undigested" macromolecules.

2651 EFFECTS OF ETHANOL ON SODIUM, 3-O-METHYL GLUCOSE, AND L-ALANINE TRANSPORT IN THE JEJUNUM. (Eng.) Kuo, Y. J.; Shanbour, L. L. (Univ. Texas Medical Sch. at Houston, Houston, TX 77030). *Am. J. Dig. Dis.* 23(1):51-56; 1978.

The effects of ethanol on Na^+, Cl^-, 3-*O*-methyl glucose (3-*O*-MG), and L-alanine fluxes were studied in the isolated rabbit jejunal mucosa. Ethanol (3% volume/volume present on both sides of the mucosa) decreased electrical potential difference (PD), short-circuit current (I_{SC}) and inhibited active transport of Na^+, 3-*O*-MG, and L-alanine. This concentration also increased the permeability of the mucosa for Cl^-, 3-*O*-MG, and L-alanine. Ethanol at 5.4% potentiated the effects on PD, I_{SC}, and the permeability for electrolytes and organic substances. These effects of ethanol could not be fully explained by an osmotic action. The results suggest that ethanol, by inhibiting intestinal absorption of Na^+, 3-*O*-MG, and L-alanine and enhancing possible fluid loss through increased permeability, may produce an effective nutritional deficiency even with adequate dietary intake.

2652 AMINO ACID TRANSPORT IN BRUSH-BORDER-MEMBRANE VESICLES ISOLATED FROM HUMAN SMALL INTESTINE. (Eng.) Lucke, H.; Haase, W.; Murer, H. (Max-Planck-Institut fur Biophysik, Kennedyallee 70, 6000 Frankfurt [Main], W. Germany). *Biochem. J.* 168(3):529-532; 1977.

L-alanine and L-phenylalanine uptake by purified brush border membrane vesicles isolated from human small intestine was investigated using a rapid-filtration technique. L-alanine entered the same osmotically reactive space as D-glucose, indicating that transport into the vesicles rather than binding to the membranes was occurring. The uptake rate for L-alanine was higher in the presence of a Na^+ gradient than in the presence of a K^+ gradient. In the presence of a Na^+ gradient, the lipophilic anion SCN^- caused an increase in L-alanine transport, whereas the nearly impermeant $SO_4{}^{2-}$ anion decreased the uptake of L-alanine compared with its uptake in the presence of Cl^-. The uptake of L-phenylalanine into the brush border membrane vesicles was also stimulated by Na^+. The results indicate that Na^+ and neutral amino acids are cotransported in the human intestinal brush border membrane.

2653 ASCORBIC ACID FLUX ACROSS MUCOSAL BORDER OF GUINEA PIG AND HUMAN ILEUM. (Eng.) Mellors, A. J.; Nahrwold, D. L.; Rose, R. C. (Milton S. Hershey Medical Center, Pennsylvania State Univ., Hershey, PA 17033). *Am. J. Physiol.* 233(5): E374-E379; 1977.

The unidirectional influx of L-$[^{14}C]$ascorbic acid across the mucosal border of guinea pig and human ileum was determined. Influx was found to follow saturation kinetics, indicating that a carrier mechanism is operative. The maximal influx in guinea pig ileum bathed in Ringer solution was 140 nmol/cm^2/hr, and the ascorbic acid concentration required to give a half-maximal influx (K_m) was 1.0 mM. At mucosal ascorbic acid concentrations greater than 6 mM, or when the tissue was bathed in Na-free media, influx was approximately linearly related to the ascorbic acid concentration, and absorption by simple diffusion may predominate. With a mucosal ascorbic acid concentration of 0.28 mM, influx was reduced by at least 70% when Na-free media was used; however, influx was not dependent on the intracellular Na concentration. The brush border mechanism appears to be stereospecific and not closely coupled to cellular metabolism. A model of transport is favored that features a carrier-mediated transport mechanism for simultaneous entry of ascorbic acid and Na across the brush border. This model is similar in nature to, but functionally distinct from, the sodium-gradient mechanism postulated to effect sugar and amino acid transport in mammalian ileal mucosa.

2654 CHARACTERIZATION AND EFFECT OF PHOSPHOLIPID ON BILE ACID ABSORPTION BY VILLI ISOLATED FROM HAMSTER SMALL INTESTINE. (Eng.) Fondacaro, J. D.; Rodgers, J. B. (Univ. Cincinnati Coll. Medicine, 231 Bethesda Ave., Cincinnati, OH 45267). *Am. J. Dig. Dis.* 23(1):12-17; 1978.

The effects of phospholipid on absorption of bile acids by hamster small intestine were studied to determine if this compound inhibits absorption of bile acids. Taurocholic and cholic acid absorption was studied using a new *in vitro* technique that relates uptake rates to the weight of the villi present on the intestinal sample rather than to the weight of the entire segment of intestine used for the study. This procedure removes from consideration various components of the intestinal wall that are not directly involved with the absorptive process. Using radioactive techniques, absorption of each type of bile acid was determined over a broad range of concentrations both in the presence and absence of phospholipid in the incubation medium. Absorption of taurocholic acid by the jejunal villi was determined to be a passive process, as previously reported. Villi from the ileum absorbed both bile acids by an apparent active process when initial concentrations of bile acids were below 2.0 mM. Above this concentration, bile acid absorption by the ileum appeared to be mainly passive. Phospholipid inhibited bile acid absorption by the ileum when initial bile acid concentrations were moderately high. However, at low substrate concentration, phospholipid has no appreciable effect on bile acid transport.

2655 DISTRIBUTION AND CONTENT OF MICROTUBULES IN RELATION TO THE TRANSPORT OF LIPID. AN ULTRASTRUCTURAL QUANTITATIVE STUDY OF THE ABSORPTIVE CELL OF THE SMALL INTESTINE.

(Eng.) Reaven, E. P.; Reaven, G. M. (Stanford Univ. Sch. Medicine, Palo Alto, CA 94304). *J. Cell Biol.* 75(2, Part 1):559-572; 1977.

To determine whether microtubules are linked to intracellular transport in absorptive cells of the proximal intestine, microtubule distribution and content were determined in cells from fasting and fed female Sprague-Dawley rats. The animals received a meal of standard chow that was consumed during a 1-hr period, and tissue was taken from the mid-jejunum before, and 0.5 hr and 6 hr after the meal. The microtubule content of apical, Golgi, and basal regions of cells was quantitated by point-counting stereology. Microtubules were localized in intracellular regions of enterocytes (apical and Golgi areas) previously shown to be associated with lipid transport. The microtubule content within apical and Golgi regions was significantly ($p<0.01$) reduced during transport of foodstuffs. To determine the effect of inhibition of microtubule assembly on transport, colchicine or vinblastine sulfate was administered to postabsorptive rats, and the lipid and microtubule content of enterocytes determined 1 and 3 hr later. After treatment with these agents, lipid was found to accumulate in apical regions of the cells; this event was associated with a significant reduction in microtubule content. The regional distribution of microtubules in enterocytes, the decrease in assembled microtubules after a fat-containing meal, and the accumulation of lipid after the administration of antimicrotubule agents suggest that microtubules are related to lipid transport in enterocytes.

2656 EFFECTS OF DIHYDROXY BILE ACIDS AND HYDROXY FATTY ACIDS ON THE ABSORPTION OF OLEIC ACID IN THE HUMAN JEJUNUM.

(Eng.) Wanitschke, R.; Ammon, H. V. (I. Med. Klinik. d. Universitat, Langenbeck Str. 1, 6500 Mainz, W. Germany). *J. Clin. Invest.* 61(1):178-186; 1978.

Perfusion studies of the normal human jejunum were carried out in healthy men to determine whether dihydroxy bile acids and hydroxy fatty acids inhibit oleic acid absorption. Deoxycholate (3 mM) and glycodeoxycholate (7 mM) inhibited the absorption of 3 mM oleic acid in isotonic micellar solutions while inducing net fluid secretion. Similarly, fractional absorption of oleic acid decreased in the presence of hydroxy fatty acids. However, only the changes induced by 2 mM ricinoleic acid could be distinguished from changes induced by an increase in total fatty acid concentration. Under all experimental conditions, close linear relationships existed between net water movement and fractional absorption of glucose, xylose, and fatty acids, as well as between the absorption rates of these solutes. In contrast, net fluid secretion induced by hypertonic D-mannitol (450 mOsm/l) had no effect on solute absorption. The observations help explain the malabsorption of fat and other nutrients in patients with the blind loop syndrome.

2657 EFFECTS OF LONG CHAIN FATTY ACIDS ON SOLUTE ABSORPTION: PERFUSION STUDIES IN THE HUMAN JEJUNUM.

(Eng.) Ammon, H. V.; Thomas, P. J.; Phillips, S. F. (Veterans Admin. Center, Wood, WI 53193). *Gut* 18(10):805-813; 1977.

Perfusion studies were carried out in healthy volunteers to test the hypothesis that net fluid secretion induced by fatty acids is accompanied by parallel reduction in solute transport. Ricinoleic acid (≥ 2 mM) provoked a marked net secretion of fluid and concomitantly inhibited the absorption of all solutes tested (glucose, xylose, L-leucine, L-lysine, folic acid, and 2-mono-olein). Oleic acid (≤ 5 mM) also reduced net fluid and solute transport, but was less potent in reducing solute absorption than was ricinoleic acid. When fluid secretion was induced osmotically with mannitol, glucose and xylose absorption was not affected. The mechanism for this generalized effect of fatty acids on solute absorption is uncertain, possibly nonspecific, and might be related to mucosal damage and altered mucosal permeability induced by these agents.

2658 CALCIUM TRANSPORT IN DISPERSED ACINAR CELLS FROM RAT PANCREAS.

(Eng.) Gardner, J. D.; Hahne, W. F. (Bldg. 10, Rm. 9D-15, Natl. Inst. Health, Bethesda, MD 20014). *Biochim. Biophys. Acta* 471(3):466-476; 1977.

Studies were carried out to elucidate the basis for the discrepancy between the results of one study in which cholecystokinin and cholinergic agents were found to increase uptake of ^{45}Ca by dispersed acinar cells from rat pancreas, and results of other studies in which cholecystokinin and cholinergic agents did not alter or cause a slight decrease in ^{45}Ca uptake by pancreatic acinar cells. In the present study, increased uptake of ^{45}Ca by acinar cells incubated with cholecystokinin occurred only in cells washed with iced, 160 mM choline chloride. This increased uptake reflected increased cellular uptake of radioactivity from the wash solution but not from the incubation medium. Cholecystokinin had no effect on uptake of ^{45}Ca by cells washed with 160 mM choline chloride, containing 5 mM ethylenediaminetetraacetate, or by cells washed with Krebs-Ringer bicarbonate. Furthermore, cells washed with 160 mM choline chloride accumulated a substantial amount of ^{45}Ca from the wash solution, and this accumulation was increased in cells that had been preincubated with cholecystokinin. Cells washed with Krebs-Ringer bicarbonate did not take up ^{45}Ca from the wash solution.

2659 INTESTINAL OSMOLALITY AND CARBOHYDRATE ABSORPTION IN RATS TREATED WITH POLY-

MERIZED GLUCOSE. (Eng.) Daum, F.; Cohen, M. I.; McNamara, H.; Finberg, L. (North Shore Univ. Hosp., 300 Community Drive, Manhasset, NY 11030). *Pediatr. Res.* 12(1):24-26; 1978.

The intestinal osmolal physiology and absorption of comparable preparations of polymerized glucose and of glucose were evaluated in isolated segments of rat duodenum. The acute rise in the osmolality of the succus entericus after 5% polymer injections (298 mOsm/kg at 3 min, 311 mOsm/kg at 30 min) was significantly less than that noted after 5% glucose (387 mOsm/kg at 3 min, 351 mOsm/kg at 30 min). At 60 min, a steady state had been established, and no significant difference was found. Injections of 10% polymer were superior to those of 10% glucose, as they also produced a lower luminal osmolality (351 mOsm/kg versus 427 mOsm/kg at 30 min). Luminal polyethylene glycol concentrations revealed comparable increases in intraluminal water content after 10% polymer and 5% glucose (22% versus 25% at 30 min) injections. After polymer injections, four times as much glucose was present in the mucosa as in the succus, whereas after 5% glucose injections, a high concentration of glucose remained in the succus. These results indicate that polymer solutions produce lower luminal osmolality than glucose solutions of similar weight. In addition, enhanced glucose absorption by the mucosal cell is suggested in animals injected with polymer. Polymerized glucose should, therefore, provide twice the calories of glucose without a disparate increase in the intestinal osmolality and intraluminal diffusion of extracellular water. Because of these properties, such a polymer may be useful in the p.o. nutritional rehabilitation of neonates and infants with diarrhea.

2660 RATES AND MECHANISMS OF GLUCOSE, GALACTOSE, AND XYLOSE ABSORPTION IN MAN IN VIVO. (Eng.) Cook, G. C. (Hosp. for Tropical Diseases, 4 St. Pancras Way, London NW1 OPE, England). *Scand. J. Gastroenterol.* 12(6):733-737; 1977.

Jejunal absorption rates of glucose, galactose, and xylose were determined consecutively in six Arab subjects *in vivo*. A double-lumen tube perfusion technique was used, and the perfusion solutions contained 200 mM of each monosaccharide. The mean xylose absorption rate (0.63 mmol/30 cm jejunum/min) was significantly lower than that for glucose ($p<0.001$) and galactose ($p<0.001$). To investigate evidence that glucose and xylose share the same jejunal transfer mechanism, their absorption rates when given alone and together, at high concentrations, were determined in six other Arabs; perfusion solutions contained 200 mM glucose, 100 mM xylose, and 200 mM glucose plus 100 mM xylose. The rates of glucose and xylose absorption were not significantly influenced by the other monosaccharide. This study does not confirm the existence of a common transfer mechanism. A significant correlation between absorption rate of glucose and the weight of xylose excreted after a 25 g p.o. load ($p<0.05$) was demonstrated.

2661 PUROMYCIN INHIBITION OF CHOLESTEROL ABSORPTION IN THE RAT. (Eng.) Vahouny, G. V.; Ito, M.; Blendermann, E. M.; Gallo, L. L.; Treadwell, C. R. (George Washington Univ., Sch. Medicine and Health Sciences, Washington, DC 20037). *J. Lipid Res.* 18(6):745-752; 1977.

The effect of puromycin on intestinal cholesterol absorption was studied in rats with indwelling catheters in the left thoracic lymphatic duct. Puromycin administration (15 mg, i.p., over 9 hr) to female Wistar rats produced a marked depression of cholesterol absorption (from 23.5% of administered dose in controls to 7.5% in treated rats) under conditions where the absorption of simultaneously administered fatty acid was also dramatically inhibited (40% that of controls). The same treatment of male rats also produced a significant depression in cholesterol absorption (14% of administered dose in treated animals), but was without effect on absorption of the fatty acid. Despite the depressions of lipid absorption in puromycin-treated animals, there was no accumulation of either cholesterol or fatty acid in the intestinal mucosa of either sex. Actinomycin D treatment (1 mg/kg) of fasting male and female rats (receiving constant infusions of saline) had no effect on the rate of lymph production. This finding suggests that altered lymph production was not responsible for the depressed lipid absorption observed in fed animals treated with protein synthesis inhibitors. The selective inhibition of cholesterol absorption in male rats also precludes the possibility that the major effect of the inhibitor is on delayed gastric emptying.

2662 INHIBITION OF FOLATE ENZYMES BY SULFASALAZINE. (Eng.) Selhub, J.; Dhar, G. J.; Rosenberg, I. H. (Univ. Chicago, Pritzker Sch. Medicine, Chicago, IL 60637). *J. Clin. Invest.* 61(1):221-224; 1978.

To further explore the mechanism of sulfasalazine action, the interaction of the drug with the folate recognition site was tested with three enzymes: dihydrofolate reductase, methylenetetrahydrofolate reductase, and serine transhydroxymethylase, each catalyzing a reaction involving a different folate derivative. Each of these enzymes was inhibited by sulfasalazine in the same concentration range as that previously observed to inhibit intestinal folate transport (0.4-1.0 mM); the kinetic data were consistent with a competitive mode of inhibition. Specificity of inhibition was demonstrated by the finding that the reduction of the pteridine ring of pteroylheptaglutamic acid by dihydrofolate reductase was subject to inhibition, whereas the hydrolysis of the γ-glutamyl peptide side chain by chicken pancreas conjugase was not affected. These results suggest that sulfasalazine interferes with a folate recognition site that is common to these enzymes and to the intestinal transport system. Sulfasalazine, therefore, has certain properties of an antifolate drug.

2663 EFFECT OF FOLATE DEFICIENCY AND ETHANOL INGESTION ON INTESTINAL FOLATE ABSORPTION. (Eng.) Racusen, L. C.; Krawitt, E. L. (Dept. Medicine, Univ. Vermont, Burlington, VT 05401). *Am. J. Dig. Dis.* 22(10):915-920; 1977.

The effects of folate deficiency, generalized malnutrition, and alcohol ingestion on jejunal transport, mucosal uptake, and reduction of folic acid were evaluated in male Sprague-Dawley rats. As measured by an everted gut sac technique, a folate-deficient diet fed *ad libitum* did not alter transport of mucosal uptake of folate. Partial starvation, which was produced in rats pair-fed with animals ingesting ethanol (20% in drinking water, 2 weeks), increased jejunal folate transport and mucosal uptake in animals ingesting either a folate-deficient or control diet (5.5 mg folate/kg diet). Ethanol ingestion by rats consuming folate-deficient or control diets resulted in transport and mucosal uptake rates intermediate in value compared to those from *ad libitum* fed and pair-fed groups. No differences in reduction of folic acid were found. These results suggest that folate depletion and ethanol ingestion, alone or in combination, do not affect the ability of the rat jejunum to transport folate, but that partial starvation results in an increase in folate transport activity.

2664 A pH-DEPENDENT, CARRIER-MEDIATED TRANSPORT SYSTEM FOR THE FOLATE ANALOG, AMETHOPTERIN, IN RAT JEJUNUM. (Eng.) Strum, W. B. (10666 N. Torrey Pines Rd., La Jolla, CA 92037). *J. Pharmacol. Exp. Ther.* 203(3):640-645; 1977.

To investigate the mechanism of intestinal folate transport, transport of the folate analog, amethopterin, was studied in the rat using everted intestinal sacs and radiolabeled drug. After an initial lag period, the transport rate for amethopterin (0.5 μM) was linear for 60 min with a rate of 8.7 pmol/min/sac at pH 6.0 and 1.36 pmol/min/sac at pH 7.4. Chromatography confirmed that amethopterin was not altered after transport from the mucosa to the serosa. At pH 6.0, the transport system was saturable with a K_m of 2.8 μM and V_{max} of 66 pmol/min/sac; at pH 7.4, the system was not saturable. Accumulation of amethopterin (0.1 μM) against a chemical gradient was observed in jejunal, but not ileal, sacs and was pH dependent. Transport inhibition at pH 6.0 was produced by hydroxylamine, azide, fluoride, dinitrophenol, iodoacetate, and *p*-chloromercuriphenylsulfonate treatment, and by the absence of oxygen; this effect was not observed at pH 7.4. The transport of amethopterin was also inhibited by folate, 5-formyltetrahydrofolate, and 5-methyltetrahydrofolate. The inhibition constant for folate (K_i=2.6 μM) was similar to the K_m value for amethopterin transport. Inhibition of amethopterin transport by folate was competitive, as shown by the effect of various concentrations of folate on the transport rate of two different concentrations of amethopterin. Of the two reduced compounds tested, 5-formyltetrahydrofolate (K_i=2.0 μM) was a slightly more effective inhibitor than 5-methyltetrahydrofolate (K_i=3.3 μM). Additional analysis of the inhibitory process was obtained by determining the effect of 10 mM iodoacetate and 50 μM folate at pH 5.5 to 7.5; the response was observed to be pH-dependent with a maximal effect at pH 6.0. These data are consistent with a pH-dependent, carrier-mediated transport system for the folate analog, amethopterin, in the rat jejunum.

2665 EFFECT OF SYSTEMIC BACTERIAL INFECTION ON ABSORPTION RATES OF L-HISTIDINE AND GLYCYLGLYCINE FROM THE HUMAN JEJUNUM IN VIVO. (Eng.) Cook, G. C. (Hosp. Tropical Diseases, 4 St. Pancras Way, London, NW1 OPE, England). *Am. J. Clin. Nutr.* 30(2):1994-1998; 1977.

Jejunal absorption rates of L-histidine (from a 100 mM solution) and glycylglycine (from a 50 mM solution) were determined with a double-lumen tube perfusion system *in vivo* in six men with acute bacterial pneumonia (infection group) and six controls with no clinical evidence of a bacterial infection. The mean rate of histidine absorption was significantly higher in the infection group (0.795 ± 0.044 mmol/30 cm jejunum/min) compared with the control group (0.637 mmol/30 cm/min, $p<0.05$), but mean rates for glycine absorption from glycylglycine were not significantly different. During the glycylglycine infusions, the luminal disappearance rate of the intact peptide was significantly greater than the total glycine absorption rate ($p<0.001$). The correlation between individual histidine and glycylglycine absorption rates was significant (r=+0.645, $p<0.05$). This correlation probably occurs because, after intracellular hydrolysis and efflux to the lumen, some glycylglycine is reabsorbed as free glycine by the amino acid transfer mechanism, and the rate of that reabsorption has previously been shown to be increased in subjects with systemic bacterial infections.

2666 EFFECTS OF SORBITOL ON THE ACTION OF ALKALINE PHOSPHATASES ISOLATED FROM VARIOUS REGIONS OF THE RAT SMALL INTESTINE. (Fre.) Dupuis, Y.; Digaud, A.; Fontaine, N. (C.N.R.S. No. 1098, Physiologie, Faculte de Pharmacie, 92290 Chatenay-Malabry, France). *C. R. Soc. Biol. (Paris)* 171(2):294-302; 1977.

2667 IRON ABSORPTION AFTER ORAL APPLICATION OF A COMBINATION OF Fe^{2+}-SUCCINATE AND MULTIVITAMINS. (Ger.) Zillessen, E.; Frerichs, F.; Herzfeld, U.; Bader, R.; Hunstein, W. (Talstrasse 24, 6900 Leimen, W. Germany). *Arzneim. Forsch.* 27(II, 8):1606-1608; 1977.

2668 TESTING OF INTESTINAL ABSORPTION IN CHRONIC ALCOHOLICS WITH D-XYLOSE. (Rum.) Radulescu, D. (Spitalul Orasenesc Dragasani, Rumania). *Rev. Ig.* 26(2):145-148; 1977.

2669 ORAL IRON TREATMENT: INTESTINAL ABSORPTION AND THE INFLUENCE OF A MEAL. (Ger.) Werner, E.; Kaltwasser, J. P.; Ihm, P. (Institut fur Biologie, Paul-Ehrlich-Str. 20, 6000 Frankfurt 70, W. Germany). *Dtsch. Med. Wochenschr.* 102(29):1061-1064; 1977.

2670 INFLUENCE OF HEPARIN ON ACTIVE GLUCOSE TRANSPORT IN THE SMALL INTESTINE IN PERITONITIS. (Rus.) Popov, V. A. (S. M. Kirov Military Medical Acad., Leningrad, USSR). *Patol. Fiziol. Eksp. Ter.* (3):75-76; 1977.

2671 PECULIARITIES OF THE SPACE-TIME ORGANIZATION OF THE SYSTEMS OF MEMBRANOUS HYDROLYSIS AND TRANSPORT INTO THE RAT SMALL INTESTINE. (Rus.) Loginov, G. I. (M. I. Kalinin Andizhan State Medical Inst., Andizhan, USSR). *Biull. Eksp. Biol. Med.* 83(5):556-558; 1977.

2672 ELECTRICAL POTENTIAL DIFFERENCE BETWEEN ILEAL MUCOSA AND SKIN IN THE CHILD: EFFECT OF REDUCING SODIUM INTAKE. (Fre.) Ricour, C.; Feydy, P.; Arhan, P. (Hopital des Enfants Malades, 149, rue de Sevres, 75730 Paris Cedex 15, France). *Ann. Biol. Anim. Biochim. Biophys.* 17(4):531-534; 1977.

See also, 2724, 2890, 2999, 3156, 3419.

MOTILITY

2673 VAGAL CONTROL OF LOWER ESOPHAGEAL SPHINCTER MOTILITY IN THE CAT. (Eng.) Gonella, J.; Niel, J. P.; Roman, C. (Institut de Neurophysiologie et Psychophysiologie, 31 Chemin Joseph Aiguier, 13274 Marseille Cedex 2, France). *J. Physiol. (Lond.)* 273(1):647-664; 1977.

The effects of vagal efferent fiber stimulation on the smooth muscle of the lower esophageal sphincter were studied in anesthetized cats and in isolated and perfused organ. In both the longitudinal and circular muscle layers, vagal stimulation elicited two types of electromyographic (EMG) potentials: (a) excitatory junction potentials (EJPS) where there was a depolarization of the smooth muscle fibers and (b) inhibitory junction potentials (IJPS) where there was hyperpolarization of the smooth muscle fibers, often followed by a transient depolarization that could initiate spikes (postinhibitory rebound). EJPS gave rise to spike potentials inducing a contraction of the sphincter. Pure IJPS were observed after atropine treatment, which suppressed EJPS. Under these conditions, a long lasting vagal stimulation induced a long duration hyperpolarization concomitant with an opening of the lower esophageal sphincter followed after the cessation of stimulation by a powerful rebound leading to a strong contraction, which closed the sphincter. The results suggest the following conclusions. Preganglionic vagal fibers are cholinergic, and they activate intramural excitatory cholinergic neurons and intramural nonadrenergic inhibitory neurons (purinergic neurons). Preganglionic fibers leading to inhibition have a higher threshold than those leading to excitation. Both excitatory and inhibitory pathways are interconnected inside the intramural network. In particular, activation of intramural inhibitory neurons, by relaxing the esophagus orally to the lower esophageal sphincter, inhibits intramural excitatory neurons and subsequently blocks vagal excitatory responses. Two functions may be attributed to the vagal extrinsic innervation: (a) closure of the lower esophageal sphincter by maintaining the basal tone of the sphincter; this would imply that at rest the inhibitory control is supplanted by the excitatory one and (b) opening the sphincter during swallowing by suppressing the excitatory stimulus and reinforcing the inhibitory one.

2674 AN EXTRALUMINAL FORCE TRANSDUCER FOR RECORDING CONTRACTILE ACTIVITY OF THE GASTROINTESTINAL SMOOTH MUSCLE IN THE CONSCIOUS DOGS: ITS CONSTRUCTION AND IMPLANTATION. (Eng.) Itoh, Z.; Honda, R.; Takeuchi, S.; Aizawa, I.; Takayanagi, R. (Gunma Univ. Sch. Medicine, Maebashi, 371, Japan). *Gastroenterol. Jpn.* 12(4):275-283; 1977.

An extraluminal strain-gauge force transducer for the continuous long-term (more than 5 months) recording of contractile activity of the gastrointestinal smooth muscle in conscious experimental animals was constructed and tested in dogs. Since the transducer is sutured onto the outside of the gut, it does not interfere with the passage of contents in the gut. The transducer was demonstrated by using it to record 24-hr changes in motor activity in the gastric body and antrum of a conscious dog using a paper recording speed of 1 mm/min. The contractile activity pattern of the stomach consisted of two major components, digestive and interdigestive states. The digestive pattern was characterized by continuous steady contractions in the antrum and no movements in the gastric body. The interdigestive pattern consisted of a period of strong contractions of short duration and long-lasting motor quiescence in the gastric body and antrum. When the contractile activity pattern of the stomach was examined using a slower recording speed, it was found that another motor pattern was present; this pattern was intermediate between the two major components of the stomach contractile activity pattern. The findings obtained with the extraluminal transducer were almost identical to changes of intraluminal pressure recorded with the use of a small balloon placed in the gastric antrum. A disadvantage of the extraluminal transducer is that it measures only muscle contractions, making it difficult to determine movements of intraluminal contents, especially in the digestive state.

2675 INTERACTION BETWEEN LONGITUDINAL AND CIRCULAR MUSCLE IN INTESTINE OF CAT. (Eng.)

Connor, J. A.; Kreulen, D.; Prosser, C. L.; Weigel, R. (Dept. Physiology, Univ. Illinois, Urbana, IL 61801). *J. Physiol. (Lond.)* 273(3):665-689; 1977.

The electrical activity of the circular and longitudinal muscle layers was studied in small intestinal segments of cats, and differences in the activities of these layers *in vivo* and *in vitro* were noted. Slow waves recorded from isolated longitudinal muscle averaged 13 mV and had slow rate of rise (0.04 V/sec), whereas recordings from intact segments showed the amplitude averaged 27 mV, and the rate of rise was more rapid (0.09 V/sec), often with a notch between the initial peak and the plateau. Membrane potentials of longitudinal muscle were similar in isolated and intact preparations (-66 mV). Resting potentials of circular muscle averaged -67 mV. Small bundles of circular muscle tested in the double sucrose gap produced activity in three categories, either spontaneously or in response to stimulation: fast spikes (50-200 msec duration), slow spikes (1-5 sec duration), and small graded responses. The duration of fast spikes was increased several-fold by the addition of 20 mM tetraethylammonium (TEA); the graded responses were converted to full-sized spikes by TEA. Treatment of circular muscle with calcium-free Krebs solution eliminated spikes, and, in intact preparations, reduced the amplitude and rate of rise of slow waves and eliminated the notch on slow waves. Current-voltage curves of longitudinal muscle showed delayed rectification in the depolarizing quadrant; similar curves of circular muscle showed anomalous rectification, i.e., a region where a very small current caused a large voltage change. Nonpolarized electrotonic coupling between longitudinal and circular layers indicates low-resistance pathways. Apparent space constants of longitudinal muscle were greater when attached to circular muscle than when isolated. It is concluded that small slow potentials originate rhythmically in longitudinal muscle, that these spread passively to circular muscle where a regenerative amplification occurs that depends on calcium conductance, and that the amplified slow waves spread back to the longitudinal layer. In the intact intestine, pacemaking is, therefore, separate from propagation, and the circular muscle provides the bulk of depolarizing current for propagation.

2676 EFFECT OF SUBSTANCE P ON INTESTINAL MUSCLE. (Eng.)

Yau, W. M. (Sch. Medicine, Southern Illinois Univ., Carbondale, IL 62901). *Gastroenterology* 74(2, Part 1):228-231; 1978.

The mode of action of synthetic substance P on small intestinal motility was investigated *in vitro* in female guinea pigs. Substance P had a major stimulating effect on the intestine by eliciting mechanical contraction and bursts of spike potentials. On a molar basis, substance P was 1.6 x 10^3 times more potent than acetylcholine. Unlike cerulein, the effects of which were mediated through the release of acetylcholine from the enteric plexuses, the site of action of substance P appeared to be directly on the muscle cells because its effects were resistant to atropine, tetrodotoxin, and Lioresal. These data strongly suggest a possible physiological role of substance P in the modulation of intestinal longitudinal muscle motor activity.

2677 EFFECTS OF SOME GASTROINTESTINAL HORMONES ON TWO MUSCLE LAYERS OF DUODENUM. (Eng.)

Anuras, S.; Cooke, A. R. (Veterans Admin. Hosp., Iowa City, IA 52242). *Am. J. Physiol.* 234(1): E60-E63; 1978.

The effects of gastrointestinal hormones on the longitudinal and circular muscle of opossum and cat duodenum were studied, to determine whether the two muscle layers respond differently to various stimuli. The duodena were cut into strips 2 mm wide and 2-2.5 cm long. Strips cut in the oral-caudal axis were called longitudinal strips; those cut at 90 degrees to that axis were called circular strips. Cholecystokinin (CCK, maximum amplitude of contraction achieved at 5 x 10^{-9} M) and cerulein (2 x 10^{-7} M) stimulated phasic contractions of circular muscle of opossum duodenum, but had no effect on the longitudinal muscle. The effect of CCK was not blocked by tetrodotoxin (10^{-7} M), indicating a direct muscle stimulation. CCK (10^{-8}, 10^{-7}, and 2.5 x 10^{-7} M) had no effect on either muscle layer of the cat duodenum. In opossum duodenum, vasoactive intestinal peptide (10^{-7} M) raised tension in longitudinal muscle by 1 g but reduced tension in circular muscle by 0.8 g. Glucagon (10^{-5} M) slightly reduced tension in both longitudinal and circular muscle of opossum duodenum. It also inhibited contractions of circular muscle caused by acetylcholine. Pentagastrin (10^{-7}, 10^{-6}, and 10^{-5} M) and secretin (10^{-8}, 10^{-7}, 10^{-6}, and 4 x 10^{-5} M) had no effect on either muscle layer in either species. These findings suggest that the circular and longitudinal muscle layers of the duodenum respond differently to at least some gastrointestinal hormones. Also, there is species variation in response to gastrointestinal hormones.

2678 INFLUENCE OF PYRIDYLISATOGEN TOSYLATE ON CONTRACTIONS PRODUCED BY ATP AND BY PURINERGIC STIMULATION IN THE TERMINAL ILEUM OF THE GUINEA-PIG. (Eng.)

Kazic, T.; Milsavljevic, D. (Dept. Pharmacology, Medical Faculty, 11000 Beograd, P.O. B 662, Yugoslavia). *J. Pharm. Pharmacol.* 29(9): 542-545; 1977.

The effect of 2-2'pyridylisatogen tosylate (PIT) on contractions produced by ATP and by purinergic stimulation was investigated in terminal segments of ileum isolated from guinea pigs. PIT did not antagonize the excitatory effects of exogenous ATP and of purinergic stimulation of the terminal guinea pig ileum. PIT (0.5-2.5 μM) potentiated the ATP-induced contractions and also the contractions produced by potassium chloride, although the potentiation could not be related to the dose in every experiment. The responses to norepinephrine, epinephrine, and histamine were slightly inhibited. PIT also potentiated the contractions produced by electrical stimulation of intramural purinergic nerves when either an alternate or uniform stimulation pattern was used. These results, in which the preparation is contracted by ATP, are opposite to those obtained with PIT on the taenia caeci, which is relaxed by ATP. This finding raises a question of duality or plurality of receptors for ATP.

2679 CONTROL OF GASTRIC EMPTYING: INTERACTION OF THE VAGUS AND PYLORIC ANTRUM.

(Eng.) Yamagishi, T.; Debas, H. T. (Dept. Surgery, Univ. British Columbia, 700 West 10th Ave., Vancouver, British Columbia V5Z 1L5, Canada). *Ann. Surg.* 187(1):91-94; 1978.

To investigate the interaction of the vagus and the pylorus in the control of gastric emptying, the gastric emptying of liquids and solids was evaluated in 10 dogs with gastric fistula before and after either truncal vagotomy, antrectomy, or pyloroplasty. In subsequent operations, the vagotomy group underwent either antrectomy or pyloroplasty, and the antrectomy and pyloroplasty groups were vagotomized. Vagotomy significantly inhibited the emptying of both liquids and solids ($p<0.001$) when the pyloric antrum was intact. When the antropyloric mechanism was removed by antrectomy, the effect of vagotomy was to accelerate the emptying of liquids ($p<0.05$) but to impair the emptying of solids ($p<0.001$). After pyloroplasty, vagotomy markedly accelerated the emptying of liquids but had little effect on the emptying of solids. Neither antrectomy nor pyloroplasty had any significant effect on the emptying of solids. Pyloroplasty caused minor acceleration of emptying of liquids while antrectomy had no effect. These data show that, after vagotomy, the pylorus acts as a major obstruction to gastric emptying of both liquids and solids.

2680 VAGALLY INDUCED GASTRIC ANTRAL CONTRACTIONS AND GASTRIC EMPTYING OF A LIQUID TEST MEAL.

(Eng.) Carr, D. H.; Brooks, F. P. (Dept. Physiology and Anatomy, Massey Univ., Palmerston North, New Zealand). *Q. J. Exp. Physiol.* 63(1): 49-58; 1978.

The emptying of a liquid test meal from the stomach was studied during, and in the absence of, electrical stimulation of cut ends of a thoracic branch of the vagus in anesthetized cats. The test meal (154 mM NaCl and 30 mg/l phenol red) was measured by collecting effluent from a duodenal fistula over a 30-min period. The stomach emptied about 60% of the meal under control conditions compared with over 90% during efferent stimulation of the vagus. The increased volumes emptied during efferent stimulation were not accounted for by gastric acid secretion. Coincident with the vagally evoked antral contractions, there was a gush of liquid from the duodenal cannula. Afferent vagal stimulation resulted in an initial marked delay of emptying followed by an acceleration so that the volume emptied after 30 min was similar to that in control experiments. These experiments show that antral contractions, evoked by efferent vagal stimulation, accelerate gastric emptying of a liquid test meal.

2681 THE INFLUENCE OF GRADED DISTENSION AND CARBACHOL ON THE MOTOR RESPONSE TO CHOLECYSTOKININ IN ISOLATED GUINEA-PIG ANTRUM AND FUNDUS.

(Eng.) Gerner, T.; Haffner, J. F. W. (Ulleval Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(6):745-749; 1977.

The effect of graded distention on the motor response to cholecystokinin (0.38 U/ml) and acetylcholine (10^{-3} M) in guinea pig antral and fundal pouches was investigated. Using a balloon technique, the pouches were increased in diameter by one-tenth of the initial diameter in each of four steps. At the concentrations used, both cholecystokinin and acetylcholine invariably stimulated motor activity. The increase mainly consisted of increased amplitude of rhythmic activity in the antrum and of increased basal pressure in the fundus. The responses to acetylcholine were consistently more pronounced than those to cholecystokinin. Distention had the most marked effect on basal pressure, but it also increased spontaneous pressure amplitude and enhanced the peak responses to cholecystokinin and acetylcholine. When the alterations in pressure were converted into wall tension the increase became even more marked. Changes in both spontaneous activity and drug responses were statistically significant ($p<0.05$) compared with undistended controls, and both spontaneous activity and drug responses reached a maximum when the pouch diameter was increased by 1.2-1.3 times its original diameter. Carbachol at concentrations of 10^{-8} to 10^{-4} M also increased rhythmic activity in the antrum and basal pressure in the fundus in a manner similar to that of cholecystokinin and acetylcholine. Prestimulation with carbachol 10 min before each addition of cholecystokinin resulted in an additive effect at the lowest carbachol concentrations (10^{-8} and 10^{-7} M); however, the response to cholecystokinin markedly declined after prestimulation with higher carbachol concentrations. The results indicate that the increased response to cholecystokinin after distention is due to increased smooth muscle stretch.

2682 EFFECT OF PENTAGASTRIN INFUSION ON GASTRIC EMPTYING RATE OF SOLID FOOD IN MAN.

(Eng.) MacGregor, I. L.; Wiley, Z. D.; Martin, P. M. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Am. J. Dig. Dis.* 23(1):72-75; 1978.

The effect of i.v. pentagastrin (4 μg/kg/hr) on the rate of gastric emptying of solid food was studied in six normal men. A meal consisting of one ^{99m}Tc-tagged chicken liver mixed with beef stew and taken with 200 ml of water was followed on its passage through the gastrointestinal tract by intermittent scanning with a gamma camera. The rate of the linear gastric emptying pattern was slowed by pentagastrin in every subject. The pH and titratable acidity of the gastric contents were similar in the pentagastrin and the control infusions. Neutralization of the gastric contents with bicarbonate in the pentagastrin studies did not alter gastric emptying rates. The results indicate that pentagastrin slows gastric emptying of solid food in man by an effect other than acid secretion.

2683 RELAXATIONS OF GUINEA-PIG FUNDIC STRIP BY ADENOSINE, ADENINE NUCLEOTIDES AND ELECTRICAL STIMULATION: ANTAGONISM BY THEOPHYLLINE AND DESENSITIZATION TO ADENOSINE AND ITS DERIVATIVES.

(Eng.) Okwuasaba, F. K.; Hamilton, J. T.; Cook, M. A. (Dept. Pharmacology, Univ. Western Ontario, London, Ontario N6A 5C1, Canada). *Eur. J. Pharmacol.* 46(3):181-198; 1977.

The effect of theophylline on relaxations of guinea pig fundic strips elicited by stimulation of noncholinergic, nonadrenergic nerves was compared to the effects of exogenously added drugs. In addition, the ability to desensitize the tissue in the presence of adenosine and related nucleotides was investigated to assess the role of the drugs as possible intramural transmitters. Adenosine and related compounds produced a concentration-dependent relaxation of the fundic strips in nontreated preparations and in preparations treated with atropine, tetrodotoxin (TTX), guanethidine, reserpine, or 6-hydroxydopamine (6-OH-DA). The relative potencies in descending order were ATP$\geq$ADP$>$adenosine. Theophylline (THEO) at low concentrations (25-75 μM) selectively antagonized the inhibitions produced by ATP, ADP, and adenosine without antagonizing those due to norepinephrine (NE), isoproterenol (ISO), and papaverine (PAPAV). Schild plots yielded apparent pA_2 values for THEO of 1.4×10^{-5} M, 1.8×10^{-5} M, and 2.8×10^{-5} M for ATP, ADP, and adenosine, resp., with slopes that were not significantly different ($p>0.05$). These results suggest competitive antagonism. Theophylline was a more specific antagonist of the relaxations induced by the purines than were compounds such as quinidine, phentolamine, or 2,2'-pyridylisatogen (PIT). In fundic strips pretreated with atropine (1×10^{-7}-5×10^{-7} M), transmural or periarterial nerve stimulation produced relaxations that were frequency-dependent. The effects of periarterial nerve stimulation were abolished by phentolamine plus propranolol, by guanethidine, by bretylium, by TTX, and by pretreatment with reserpine or 6-OH-DA. The responses to transmural nerve stimulation were abolished only by TTX. The relaxations induced by transmural nerve stimulation were reduced or abolished by THEO, whereas those produced by periarterial nerve stimulation were not affected. Theophylline was more selective than quinidine or phentolamine in blocking such responses. Exposure of the tissues to high concentrations of ATP, ADP, or adenosine caused tachyphylaxis to the relaxations induced by the purines as well as those to transmural nerve stimulation, while the responses to NA, ISO, PAPAV, or periarterial nerve stimulation were either augmented or unaffected. The effects of desensitization were reversible. This finding suggests that the response to transmural nerve stimulation may be due to neural release of adenosine or a related compound. An adenine nucleotide or nucleoside released from nerves might have a physiological function in the "receptive relaxation" of the stomach following stimulation of the pharynx and upper esophagus by passage of a bolus of food.

2684 EFFECT OF VASOACTIVE INTESTINAL POLYPEPTIDE ON GALLBLADDER SMOOTH MUSCLE IN VITRO.

(Eng.) Ryan, J. P.; Ryave, S. (Temple Univ. Sch. Medicine, Philadelphia, PA 19140). *Am. J. Physiol.* 234(1):E44-E46; 1978.

The effect of vasoactive intestinal polypeptide (VIP) on basal tension and on tension induced by octapeptide of cholecystokinin (OP-CCK) was examined with guinea pig gallbladder smooth muscle strips *in vitro*. VIP (1.0-200.0 ng/ml) alone produced dose-related decreases in resting tension, and antagonized spontaneous contractile activity where present. In combination with OP-CCK (0.1-10.0 ng/ml), VIP decreased the expected contractile response. The degree of antagonism depended upon the concentrations of OP-CCK and VIP. VIP had no effect on acetylcholine-induced contractions. It is proposed that VIP can affect gallbladder motor activity by decreasing smooth muscle tone and by antagonizing cholecystokinin. These findings support the proposal that gallbladder motor function may depend upon the action and interaction of the gastrointestinal hormones.

2685 INFLUENCE OF THE REMOVAL OF EXTERNAL K ON TONUS AND DRUG-INDUCED CONTRACTIONS OF THE ISOLATED RAT ILEUM, PARTICULARLY IN RELATION TO Ca.

(Eng.) Takahashi, N. (Kobe Univ. Sch. Medicine, Japan). *Kobe J. Med. Sci.* 22(4):273-282; 1976.

2686 IRREVERSIBLE INHIBITION BY ATROPINE OF DRUG-INDUCED CONTRACTIONS IN ISOLATED RABBIT ILEUM, PARTICULARLY IN RELATION TO THE MOBILIZATION OF Ca.

(Eng.) Araki, H.; Cheng, J. T.; Ogino, K.; Taniyama, K. (Kobe Univ. Sch. Medicine, Japan). *Kobe J. Med. Sci.* 22(4):247-253; 1976.

2687 IRREVERSIBLE INHIBITORY EFFECT OF ATROPINE ON THE CONTRACTILE RESPONSES TO DRUGS IN ISOLATED RAT RECTUM, PARTICULARLY IN RELATION TO Ca.

(Eng.) Ogino, K.; Cheng, J. T.; Araki, H. (Kobe Univ. Sch. Medicine, Japan). *Kobe J. Med. Sci.* 22(4):239-246; 1976.

2688 EFFECT OF INTRACEREBROVENTRICULAR ADMINISTRATION OF MORPHINE UPON INTESTINAL MOTILITY IN RAT AND ITS ANTAGONISM WITH NALOXONE.

(Eng.) Parolaro, D.; Sala, M.; Gori, E. (Inst. Pharmacology, Univ. Milan, Via Vanvitelli 32/A, 20129 Milan, Italy). *Eur. J. Pharmacol.* 46(4): 329-338; 1977.

2689 TWO METHODS TO ASSESS THE GASTRO-INTESTINAL TRANSIT-TIME IN MICE.

(Eng.) Koopman, J. P.; Kennis, H. M. (Central Animal Lab., Catholic

Univ. Nijmegen, Geert Grooteplein Noord 29, Nijmegen, Netherlands). *Z. Versuchstierk.* 19(6):298-303; 1977.

2690 ACTION OF HISTAMINE AND RELATED COMPOUNDS ON THE PYLORIC SPHINCTER OF THE RAT. (Eng.) Bertaccini, G.; Coruzzi, G.; Molina, E.; Chivarini, M. (Ospedale Maggiore, Via Gramsci 14, 43100 Parma, Italy). *Rend. Gastroenterol.* 9(3): 163-168; 1977.

2691 CONTRIBTION TO THE STUDY OF THE FUNCTIONING OF ODDI'S SPHINCTER. (Eng.) Caroli, J. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 48-51; 1977.

2692 NORMAL PHYSIOLOGY OF ODDI'S SPHINCTER; NERVOUS REGULATION; PHARMACOLOGICAL STUDIES. (Eng.) Stalport, J. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 52-57; 1977.

2693 EXPERIMENTAL STUDY OF ODDI PHYSIOLOGY BY PNEUMOFLOWMETER. (Eng.) Arsac, M.; Kieffer, J. L.; Salamao, J. P.; Piettre, G. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 58-60; 1977.

2694 POSTOPERATIVE BILIARY MANOMETRY: EFFECTS OF MORPHINE AND ANTISPASMODICS UNDER VARIOUS FLOW RATES OF INTRACHOLEDOCHAL INFUSION. (Eng.) Galmiche, J. P.; Gislon, J.; Bonfils, S. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 61-65; 1977.

2695 DUODENOSCOPIC MANOMETRY OF THE COMMON BILE DUCT. (Eng.) Hagenmuller, F.; Ossenberg, F. W.; Classen, M. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 72-76; 1977.

2696 PAPILLA ELECTROMYOGRAPHY: ENDOLUMINAL RECORDING PERFORMED IN MAN BY PERDUODENOSCOPIC CANNULATION. (Eng.) Salducci, J.; Naudy, B.; Pin, G.; Ranieri, F.; Monges, H. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 77-79; 1977.

2697 MANOMETRIC AND ELECTROMYOGRAPHIC DATA CONCERNING HUMAN DUODENUM: DO DUODENAL SPHINCTERS EXIST? (Eng.) Salducci, J.; Naudy, B. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 129-130; 1977.

2698 MOTOR RESPONSES TO GASTRIN AND CHOLECYSTOKININ IN GUINEA-PIG ISOLATED ANTRUM AND FUNDUS [Abstract]. (Eng.) Gerner, T.; Haffner, J. F. W. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):21; 1977.

2699 SIMULTANEOUS RECORDING OF GASTRIC AND DUODENAL ELECTRICAL ACTIVITY [Abstract]. (Eng.) Civalero, L. A.; Kantelius, M.; Nilsson, B. Y. (Dept. Surgery, Sodersjukhuset, Stockholm, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 45):17; 1977.

2700 CALCULATED MAXIMAL AMPLITUDE VERSUS MILLAR MICRO-TIP IN RECORDING OF ESOPHAGEAL PERISTALSIS [Abstract]. (Eng.) Boesby, S.; Madsen, T.; Pedersen, S. A. (Odense Univ. Hosp., Odense, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):13; 1977.

2701 GASTRIC ADAPTIVE RELAXATION. EFFECTS OF VAGAL ACTIVATION AND VAGOTOMY: AN EXPERIMENTAL STUDY IN DOGS AND IN MAN. (Eng.) Jahnberg, T. (Sahlgren's Hosp., Goteborg, Sweden). *Scand. J. Gastroenterol.* 12(Suppl. 46):1-32; 1977.

2702 CONTINUOUS QUANTITATION OF GALLBLADDER EMPTYING IN RESPONSE TO INCREASING DOSES OF CHOLECYSTOKININ (CCK) [Abstract]. (Eng.) Spellman, S. J.; Shaffer, E. A.; Rosenthall, L. (Montreal General Hosp., Montreal, Quebec, Canada). *Clin. Res.* 25(5):689A; 1977.

2703 EFFECTS OF PENTAGASTRIN ON THE CIRCULAR MUSCLE OF THE CORPUS AND FUNDUS AND ON THE GASTRIC SLING MUSCLE OF THE DOG [Abstract]. (Eng.) Hughes, J.; Kreulen, D. L.; Szurszewski, J. H. (Mayo Medical Sch., Rochester, MN 55901). *Physiologist* 20(4):45; 1977.

2704 NEW KNOWLEDGE ON PHYSIOLOGY AND PATHOPHYSIOLOGY OF HUMAN INTESTINAL MOTILITY [Abstract]. (Eng./Ger.) Kern, E.; Schmidt, E.; Laven, R.; Bruch, H. P. (Chirurgische Univ.-Klinik, Josef Schneider-Str. 2, D-8700 Wurzburg, W. Germany). *Langenbecks Arch. Chir.* 345:611; 1977.

2705 MILLAR MICRO-TIP PRESSURE TRANSDUCERS USED IN OESOPHAGEAL MANOMETRY ON NORMAL SUBJECTS [Abstract]. (Eng.) Wallin, L.; Boesby, S.; Madsen, T. (Odense Univ. Hosp., DK-5000 Odense, Denmark). *Scand. J. Gastroenterol.* 12 (Suppl. 45):112; 1977.

2706 VAGAL MEDIATION OF GASTRIC MOTILITY AND EMPTYING IN ANESTHETIZED CATS [Abstract]. (Eng.) Bauer, R. F.; Silverman, L.; Brooks, F. P. (Dept. Physiology, Univ. Pennsylvania, Philadelphia, PA 19104). *Physiologist* 20(4):6; 1977.

2707 CALCIUM AND THE CONTRACTILE RESPONSE TO PROSTAGLANDIN IN THE SMOOTH MUSCLE OF GUINEA-PIG STOMACH. (Eng.) Ishizawa, M.; Miyazaki, E. (Sapporo Medical Coll., W.17, S. 1, Sapporo, Japan). *Experientia* 33(3):376-377; 1977.

2708 GASTRIC RELAXATORY RESPONSE TO FEEDING BEFORE AND AFTER VAGOTOMY. (Eng.) Jahnberg, T.; Abrahamsson, H.; Jansson, G.; Martinson, J. (Sahlgren's Hosp., 41345 Goteborg, Sweden). *Scand. J. Gastroenterol.* 12(2):225-228; 1977.

2709 EFFECT OF VAGOTOMY ON GASTRIC MOTILITY. (Eng.) Stadaas, J. O. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 11(Suppl. 42):85-88; 1976.

2710 AN APPARATUS FOR CHEMICAL AND ELECTRICAL STIMULATION OF THE ISOLATED RAT ILEUM. (Eng.) Von Wietersheim, A.; Hock, F. J. (Gesamthochschule Kassel, Heinrich-Plett-Strasse 40, D-3500 Kassel, W. Germany). *Pfluegers Arch.* 369(3):289-290; 1977.

2711 THE SUSPENSORY MUSCLE OF THE DUODENUM AND ITS NERVE SUPPLY. (Eng.) Jit, I.; Grewal, S. S. (Postgraduate Inst. Medical Education, Res., Chandigarh, India). *J. Anat.* 123(2):397-405; 1977.

See also, 2632, 2643, 2719, 2747, 2756, 2908, 2914, 2993, 3005, 3021, 3023, 3027, 3035, 3061, 3091, 3094, 3198.

SECRETION AND METABOLISM

2712 HEPTADECAPEPTIDE GASTRIN IN THE VAGAL NERVE. (Eng.) Uvnas-Wallensten, K.; Rehfeld, J. F.; Larsson, L. I.; Uvnas, B. (Karolinska Institutet, Stockholm, Sweden). *Proc. Natl. Acad. Sci. USA* 74(12):5707-5710; 1977.

Studies were carried out to determine whether heptadecapeptide gastrin is present in specimens from the main trunks of the cervical, thoracic, and abdominal vagi of dogs and cats and in specimens from the abdominal vagus of humans. Immunoreactive gastrin was present in vagal nerves from cats, dogs, and humans. The abdominal portion of the vagus contained gastrin in amounts ranging from 16 to 273 pmol/g of nerve tissue (wet weight). The thoracic and cervical portion of the vagi contained only minute amounts of gastrin. Gel chromatography of extracts of human, canine, and feline abdominal vagi monitored by region-specific antisera against heptadecapeptide gastrin and triacontatriapeptide cholecystokinin revealed that the vagal gastrin immunoreactivity predominantly consisted of heptadecapeptide gastrin. In addition, the vagi contained small amounts of the NH_2-terminal tridecapeptide gastrin fragment as well as of the putative biosynthetic gastrin precursors, components I and II. No cholecystokinin-like molecules were demonstrable. Immunocytochemical studies demonstrated gastrin-containing nerves in the intestinal wall. The nerves were most numerous in the large and distal small intestine. These findings suggest that heptadecapeptide gastrin may represent a new vagal neurotransmitter.

2713 XYLITOL ASSOCIATED CHANGES IN AMYLASE AND PROTEIN CONTENT OF MONKEY PAROTID SALIVA. (Eng.) Bird, J. L.; Baum, B. J.; Makinen, K. K.; Bowen, W. H.; Longton, R. W. (Naval Medical Res. Inst., Bethesda, MD 20014). *J. Nutr.* 107(10):1763-1767; 1977.

2714 EFFECTS OF SEX HORMONES ON SYNTHESIS OF PROTEINS CONTAINED IN GRANULES PRESENT IN CONVOLUTED TUBULAR CELLS OF MOUSE SUBMANDIBULAR GLANDS. (Eng.) Hosoi, K.; Ueha, T. (Josai Dental Univ., Sakado, Saitama 350-02, Japan). *J. Biochem. (Tokyo)* 82(2):351-358; 1977.

2715 UROGASTRONE LEVELS IN THE URINE OF NORMAL ADULT HUMANS. (Eng.) Gregory, H.; Holmes, J. E.; Willshire, I. R. (Imperial Chemical Industries Ltd., Alderly Park, Macclesfield, Cheshire, England). *J. Clin. Endocrinol. Metab.* 45(4):668-672; 1977.

2716 CATALASE IN SALIVARY GLAND STRIATED AND EXCRETORY DUCT CELLS. I. THE DISTRIBUTION OF CYTOPLASMIC AND PARTICULATE CATALASE AND THE PRESENCE OF CATALASE-POSITIVE RODS. (Eng.) Hanker, J. S.; Preece, J. W.; Burkes, E. J., Jr.; Romanovicz, D. K. (Univ. North Carolina at Chapel Hill, Chapel Hill, NC 27514). *Histochem. J.* 9(6):711-728; 1977.

2717 FUNCTIONAL MEDIATION OF COMPENSATORY ENLARGEMENT OF THE PAROTID GLAND. (Eng.) Hall, H. D.; Schneyer, C. A. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232). *Cell Tissue Res.* 184(2):249-254; 1977.

2718 THE DECOMPOSITION OF MONOFLUOROPHOSPHATE BY ENZYMES IN WHOLE HUMAN SALIVA. (Eng.) Pearce, E. I. F.; Jenkins, G. N. (Medical Res.

Council New Zealand, P.O. Box 27007, Wellington, New Zealand). *Arch. Oral Biol.* 22(6):405-407; 1977.

2719 THYROTROPIN-RELEASING HORMONE IN THE GASTROINTESTINAL TRACT. (Eng.) Morley, J. E.; Garvin, T. J.; Pekary, A. E.; Hershman, J. M. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA 90073). *Biochem. Biophys. Res. Commun.* 79(1): 314-318; 1977.

See also, 2629, 2727, 2914, 2921, 3351.

SECRETION AND METABOLISM

Stomach

2720 CONCENTRATIONS OF GASTRIN AND SECRETIN IN THE ALIMENTARY TRACT OF THE CAT. (Eng.) Miller, T. A.; Llanos, O. L.; Swierczek, J. S.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *Surgery* 83(1):90-93; 1978.

The distribution of gastrin and secretin was determined from the esophagogastric junction to the ileocecum in the cat. The total content and concentration of each of these hormones in mucosal extracts taken from the gastric fundus, gastric antrum, proximal and distal duodenum, proximal and distal jejunum, and ileum were measured with specific radioimmunoassays. The gastric antrum contained the highest concentration of gastrin (31,686.2 ± 8,375.7 ng), but appreciable amounts also were found in the duodenum (642.7 ± 184.6 and 1,074.0 ± 127.7 ng in proximal and distal regions, resp.). The highest concentrations of secretin were found in the duodenum (293.3 ± 43.4 and 1,323.7 ± 188.6 ng in proximal and distal regions, resp.), but impressive quantities were measured in the jejunum (710.2 ± 256.9 and 435.2 ± 90.8 ng in proximal and distal regions, resp.). The role of extra-antral gastrin and of those stores of secretin beyond the proximal duodenum (where the pH probably never falls to levels associated with release of secretin) currently are unknown.

2721 SECRETORY STATE OF GASTRIC MUCOSA AND ITS RESISTANCE TO ASPIRIN INJURY. (Eng.) Porterfield, G. N.; Cheung, L. Y. (Washington Univ. Sch. Medicine, 4960 Audubon Ave., St. Louis, MO 63110). *Am. J. Surg.* 135(1):115-119; 1978.

The influence of the secretory status on gastric mucosal tolerance to aspirin injury was assessed in a canine *ex vivo* model, which provided two segments of mucosa supplied by a single vascular pedicle in the same dog. Acid secretion was stimulated by the i.v. infusion of histamine (1 µg/kg/min) in one mucosa, whereas the secretory response to histamine was significantly impaired by topical treatment with 16,16-dimethylprostaglandin E_2 (25 µg) in the other. The secreting mucosa exhibited a twofold greater blood flow than the inhibited mucosa. Exposure of both mucosae to 20 mM aspirin for 30 min resulted in the appearance of small multiple superficial erosions. The degree of mucosal injury was not significantly different between the secreting and inhibited mucosae. The extent of mucosal damage was similar to that seen when aspirin in acid was placed on resting mucosa in the same model. These data do not support the hypothesis that histamine-stimulated acid secretion and accompanying increase in gastric mucosal blood flow protects against aspirin injury.

2722 EFFECT OF Ca^{2+}, Mg^{2+}, NaN_3, CHOLINERGIC AGENTS, AND GASTROINTESTINAL HORMONES ON THE GUANYLATE CYCLASE FROM GUINEA PIG GASTRIC MUCOSA. (Eng.) Griessen, M. (Hopital Cantonal, 1211 Geneve 4, Switzerland). *Gastroenterology* 74(2, Part 1):263-270; 1978.

The kinetic properties of gastric mucosal guanylate cyclase were examined in the guinea pig gastric mucosa, and the possibility that choline esters and pentagastrin increase the cyclic GMP production in the guinea pig gastric mucosa was tested. Guanylate cyclase in the fundic mucosa occurred in two enzymatic forms: a "soluble" form and a particulate form. The mean basal activity of the soluble fraction measured in the presence of 300 µM guanosine-5'-triphosphate and 5 mM $MnCl_2$ was 72.6 ± 5.3 pmol cyclic GMP/mg protein/min. Guanylate cyclase activity was dependent on Mn^{2+}; it was increased by sodium azide (NaN_3), $CaCl_2$, cysteine, secretin, and cholecystokinin, but it was not influenced by gastrin, histamine, cholinergic esters, or prostaglandins E_1 and A_1. NaN_3 (1 mM) decreased the apparent K_m for $MnCl_2$ and potentiated the effects of $MgCl_2$. The activity of the particulate fraction represented about 14% of that of the supernatant fraction. The guanylate cyclase activity of that fraction was not modified by NaN_3, gastrin, cholinergic agents, secretin, or cholecystokinin. Cysteine inhibited its activity. These data do not support the hypothesis that cyclic GMP acts as a second messenger for the action of cholinergic agents and gastrin in the guinea pig gastric mucosa.

2723 GASTRIC MUCOSAL DAMAGE BY TAURINE AND GLYCINE CONJUGATES OF CHENODEOXYCHOLIC ACID.

(Eng.) Black, R. B.; Naylor, F.; Stenhouse, N. S. (Queen Elizabeth Hosp., Woodville, South Australia 5011, Australia). *Am. J. Dig. Dis.* 22(12):1106-1108; 1977.

To determine whether the greater bile acid-induced gastric mucosal damage seen at an acid pH is dependent upon the type of bile acid conjugation, pure 10 mM solutions of taurine and glycine conjugates of chenodeoxycholic acid were instilled into canine Heidenhain pouches. Solutions were prepared at pH 2, 4, and 8. The pH effect was confirmed, but only with respect to movement of Na^+ ion for taurine conjugates. The magnitude of the changes in ionic movements was much greater with pure bile acid solutions than that seen previously with whole bile. The greater damage seen below the pK_a of the bile acid conjugates suggests that its nonionized form is the more damaging.

2724 EFFECT OF PROTEOLYTIC ENZYMES ON THE BINDING OF COBALAMIN TO R PROTEIN AND INTRINSIC FACTOR: IN VITRO EVIDENCE THAT A FAILURE TO PARTIALLY DEGRADE R PROTEIN IS RESPONSIBLE FOR COBALAMIN MALABSORPTION IN PANCREATIC INSUFFICIENCY.

(Eng.) Allen, R. H.; Seetharam, B.; Podell, E.; Alpers, D. H. (Univ. Colorado Medical Center, Denver, CO 80262). *J. Clin. Invest.* 61(1):47-54; 1978.

To test the hypothesis that R protein acts as an inhibitor of cobalamin (Cbl) absorption and that pancreatic proteases are required to alter R protein and prevent such inhibition, the ability of R protein and intrinsic factor (IF) to compete for Cbl binding, and the ability of pancreatic proteases to alter this competition, were studied. Human salivary R protein bound Cbl with affinities that were 50- and 3-fold higher than those of human IF at pH 2 and 8, resp. Cbl bound to IF was transferred to an equal amount of R protein with half times of 2 and 90 min at pH 2 and 8, resp., and within several hours the respective ratios of R protein-Cbl/IF-Cbl of 50 and 2 were observed. Cbl bound to R protein was not transferred to IF at either pH 2 or 8. Incubation of R protein with pancreatic proteases at pH 8 led to a 150-fold decrease in its affinity for Cbl. Incubation of R protein-Cbl with pancreatic proteases led to complete transfer of Cbl to IF within 10 min. Gel filtration studies with R protein-^{57}Co-Cbl and ^{125}I-R protein showed that pancreatic proteases partially degraded R protein. Pancreatic proteases differed in their ability to effect these changes with trypsin>chymotrypsin>elastase. Pancreatic proteases did not alter IF in any of the parameters mentioned above. Pepsin failed to alter either R protein or IF. These studies suggest: (a) that Cbl is bound almost exclusively to R protein in the acid milieu of the stomach, rather than to IF; (b) that Cbl remains bound to R protein in the slightly alkaline environment of the intestine until pancreatic proteases partially degrade R protein and enable Cbl to become bound exclusively to IF; and (c) that the primary defect in Cbl absorption in pancreatic insufficiency is a lack of pancreatic proteases and a failure to alter R protein and effect the transfer to Cbl to IF. These studies also suggest that the partial correction of Cbl malabsorption observed with bicarbonate is due to neutralization of gastric HCl, since at slightly alkaline pH, IF can partially compete with R protein for the initial binding and retention of Cbl.

2725 INFLUENCE OF BETA RECEPTOR BLOCKADE ON PENTAGASTRIN-STIMULATED GASTRIC SECRETION.

(Ger.) Anschelwitsch, J.; Okun, K. (Therapeutische Hospitalklinik, Medizinische Institut Riga, Bulv. Padomju 12, Riga, USSR). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(5/6):219-223; 1977.

The effect of beta receptor blockade by propranolol (4 mg, i.v.) on the gastric secretion induced by pentagastrin (6 µg/kg) was studied in 27 men aged 20-50 yr. They included healthy persons and patients with duodenal and gastric ulcers. Propranolol was administered immediately before pentagastrin. While pentagastrin alone reduced the pH of the gastric juice by 1.3-1.4 units, it had no pH-reducing effect during beta receptor blockade. Propranolol significantly reduced the stimulating effect of pentagastrin on gastric secretion; the volume of the gastric juice decreased by 50%, the hydrochloric acid content by 35%, the hydrochloric acid concentration by 23%, and the quantity of pepsin by 72%. The proteolytic enzyme secretion was 124.6 mg/hr following pentagastrin stimulation, and 72.2 mg/hr following pentagastrin stimulation under beta receptor blockade. The findings indicate the great significance of beta-adrenergic processes in the secretory effect of pentagastrin.

2726 EFFECT OF SUB-DIAPHRAGMATIC VAGOTOMY ON GASTRIC MUCOSAL MAST CELL POPULATION IN PYLORUS LIGATED RATS.

(Eng.) Ganguly, A. K.; Sathiamoorthy, S. S.; Bhatnagar, O. P. (Government Medical Coll., Surat-395 001, India). *Q. J. Exp. Physiol.* 63(1):89-92; 1978.

The role of the vagus in the development of experimental stress ulcers was assessed by studying the gastric mucosal mast cell population following subdiaphragmatic vagotomy in albino rats, 6 and 12 hr after pylorus ligation, or in control rats with a sham-vagotomy. Subdiaphragmatic vagotomy significantly increased the gastric mucosal mast cell population in both 6- and 12-hr groups (from 189 ± 9 cells/mm^2 gastric mucosa in controls to 269 ± 8 cells/mm^2 6 hr after ligation, $p<0.001$; from 129 ± 7 to 322 ± 10 cells/mm^2 12 hr after ligation, $p<0.001$). The results suggest that the vagal impulses act on the gastric mucosal mast cells causing their degranulation. Following vagotomy, the contents stay bound within the mast cells. The increase in the mast cell population 12 hr after pylorus ligation may have been due to the continuation of normal turnover of the mast cells in the gastric mucosa. The results do not support the conclusion that the vagal influence on mast cell population is similar throughout the gastrointestinal tract.

2727 THE PARATHYROID GLANDS IN EXPERIMENTALLY INDUCED HYPERGASTRINEMIA IN THE RAT. (Eng.) Grimelius, L.; Johansson, H.; Lundqvist, G.; Olazabal, A.; Polak, J. H.; Pearse, A. G. E. (Dept. Pathology, Univ. Uppsala, P.O. Box 553, S-751 22 Uppsala, Sweden). *Scand. J. Gastroenterol.* 12(6):739-744; 1977.

To determine the importance of hypergastrinemia in the development of hyperparathyroidism, the morphology of the parathyroids in male Sprague-Dawley rats with hypergastrinemia, induced by antral exclusion, was compared with that of glands from untreated rats and animals from which the main source of gastrin-17 was excluded by antral resection. Fourteen weeks after induction of hypergastrinemia, the volume of the parathyroids was significantly increased in comparison with that in controls ($0.001<p<0.01$), owing to hyperplasia of the parenchymal cells. Removal of the antral gastrin-producing capacity of the same duration was not accompanied by any significant changes in the parathyroids. These findings suggest that hypergastrinemia could be a stimulus for the development of hyperplasia of the parathyroids, and that it may be an etiological factor in the production of hyperparathyroidism.

2728 DOES ACID BACK DIFFUSION AND DILUTION REDUCE THE CONCENTRATION OF ACID SECRETED BY THE PARIETAL CELL [Abstract]? (Eng.) Thompson, M. R.; Gipsman, M. (Manchester Royal Infirmary, Manchester, England). *Gut* 18(11):A948; 1977.

2729 EFFECT OF PROLONGED METIAMIDE MEDICATION ON ACID SECRETORY CAPACITY AND GASTRIN SENSITIVITY OF THE RAT PARIETAL CELL [Abstract]. (Eng.) Halter, F.; Hacki, W. H.; Hacki, S. K.; Witzel, L. (Inselspital, Bern, Switzerland). *Gut* 18(11):A948; 1977.

2730 FAILURE TO DETECT BACK-DIFFUSION IN HUMAN GASTRIC ASPIRATE [Abstract]. (Eng.) Whitfield, P. F.; Hobsley, M. (Middlesex Hosp. and Medical Sch., London, England). *Gut* 18(11):A947-A948; 1977.

2731 DEMONSTRATION OF GASTRIN BINDING SITES IN THE RAT STOMACH [Abstract]. (Eng.) Brown, J.; Galagher, N. D. (Royal Prince Alfred Hosp., Camperdown, New South Wales, Australia). *Clin. Exp. Pharmacol. Physiol.* 4(5):480-481; 1977.

2732 A COMPARISON OF THE EFFECTS OF STABLE ENDOPEROXIDE ANALOGUES WITH PGE_2 AND $PGF_{2\alpha}$ ON RAT GASTRIC SECRETION, IN VIVO AND IN VITRO [Abstract]. (Eng.) Frame, M. H.; Main, I. H. M. (Sch. Pharmacy, London Univ., 29/39 Brunswick Square, London WC1N 1AX, England). *Br. J. Pharmacol.* 61(3):450P; 1977.

2733 CLASSIFICATION OF THE β-ADRENOCEPTORS THAT MEDIATE INHIBITION OF PENTAGASTRIN-INDUCED GASTRIC ACID SECRETION IN THE DOG [Abstract]. (Eng.) Daly, M. J.; Long, J. M.; Stables, R. (Dept. Pharmacology, Allen and Hanburys Res. Ltd., Ware, Hertfordshire SG12 0DJ, England). *Br. J. Pharmacol.* 61(3):462P; 1977.

2734 HISTAMINE OUTPUT FROM THE RAT ISOLATED GASTRIC MUCOSA DURING ACID SECRETION STIMULATED BY PENTAGASTRIN, METHACHOLINE AND DIBUTYRYL CYCLIC ADENOSINE 3',5'-MONOPHOSPHATE [Abstract]. (Eng.) Main, I. H. M.; Pearce, J. B. (Sch. Pharmacy, Univ. London, 29/39 Brunswick Square, London WC1N 1AX, England). *Br. J. Pharmacol.* 61(3):461P; 1977.

2735 INTRACELLULAR ASPECTS OF GASTRIN SECRETION [Abstract]. (Eng.) Bastie, M. J.; Senegas, F.; Balas, D.; Pradayrol, L.; Frexinos, J.; Ribet, A. (INSERM, U 151, C.H.U. de Rangueil, 31054 Toulouse, France). *Digestion* 16(1/2):203; 1977.

2736 EFFECT OF CHRONIC SECRETIN, PENTAGASTRIN AND CHOLECYSTOKININ ON STOMACH OF RATS [Abstract]. (Eng.) Petersen, H.; Solomon, T.; Crossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):484; 1977.

2737 STIMULATION OF THE ENDOGENOUS CYCLIC AMP-PRODUCTION IN ISOLATED GASTRIC MUCOSAL CELLS [Abstract]. (Eng.) Sonnenberg, A.; Moran, J.; Fisher, J. A.; Blum, A. L. (Stadtspital Triemli, Zurich, Switzerland). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):485; 1977.

2738 PEPSIN STIMULATION BY GASTROINTESTINAL HORMONES IN THE CAT [Abstract]. (Eng.) Vagne, M.; Perret, G.; Desvigne, C. (INSERM U 45, Pav. Hbis, Hopital E. Herriot, 69430 Lyon Cedex 2, France). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):485-486; 1977.

2739 THE EFFECTS OF GASTRIC DISTENSION ON ACID SECRETION IN MAN [Abstract]. (Eng.) Olbe, L.; Bergegardh, S.; Grotzinger, U.; Schoon, I. M. (No affiliation given). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):486-487; 1977.

2740 FORMATION OF GASTRIN COMPONENT IV IN CAT ANTRA [Abstract]. (Eng.) Blair, E. L.; Hammill, A.; Lund, P. K.; Sanders, D. J. (Physiology Dept., Univ. Newcastle, Newcastle-upon-Tyne NE1 7RU, England). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):490; 1977.

2741 EFFECT OF CALCIUM ON ACID SECRETION BY THE ISOLATED RAT GASTRIC MUCOSA [Abstract]. (Eng.) Main, I. H. M.; Pearce, J. B. (Sch. Pharmacy, Univ. London, 29/39 Brunswick Square, London WC1N 1AX, England). *Br. J. Pharmacol.* 61(1):124P; 1977.

2742 STIMULATION OF GASTRIC ACID SECRETION BY INTRAVENOUS AMINO ACIDS [Abstract]. (Eng.) Konturek, S. J.; Tasler, J.; Cieszkowski, M. (Inst. Physiology, Medical Acad., Cracow, Poland). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):491-492; 1977.

2743 DAMAGE AND REPAIR OF THE GASTRIC MUCOSA IN RATS FOLLOWING SHORT TERM ADMINISTRATION OF CORTISONE [Abstract]. (Eng.) Ellen, W. A.; Hopman, P. J.; Klopper. (Academic Hosp. "Wilhelmina Gasthuis," Amsterdam, Netherlands). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):492; 1977.

2744 BIOSYNTHESIS OF GASTRIN BY RAT ANTRAL POLYSOMES [Abstract]. (Eng.) Strunz, U.; Legler, U. F.; Schmack, B.; Sewing, K. F. (Dept. Medicine, Univ. Erlangen-Nurnberg, Nurnberg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):492-493; 1977.

2745 COMPARISON BETWEEN GSP AND HYPOXANTHINE ON GASTRIC SECRETION IN DOGS [Abstract]. (Eng.) Lepeltier, M.; Sauvage, M.; Vatier, J. (INSERM U 10, Hopital Bichat, 170 Bd Ney, 75877 Paris, Cedex 18, France). *Digestion* 16(1/2):214; 1977.

2746 MECHANISM OF THE INHIBITION OF ACID SECRETION AND GASTRIN RELEASE BY THE JEJUNUM IN DOGS [Abstract]. (Eng.) Carpentier, Y.; Melon, C.; Woussen-Colle, M. C.; De Graef, J. (Hopital Saint-Pierre, B-1000 Brussels, Belgium). *Digestion* 16 (1/2):205-206; 1977.

2747 EFFECT OF 2-DEOXYGLUCOSE ON GASTRIC SECRETION AND ANTRAL MUSCLE CONTRACTION BEFORE AND AFTER HIGHLY SELECTIVE VAGOTOMY IN DOGS [Abstract]. (Eng.) Boiselle, J. C.; Roze, C.; Vatier, J. (INSERM U 10, Hopital Bichat, 170 Bd Ney, 75877 Paris, Cedex 18, France). *Digestion* 16(1/2):204-205; 1977.

2748 CIRCADIAN VARIATION OF SERUM GASTRIN LEVEL AND CELL RENEWAL IN JEJUNAL MUCOSA DURING FAST IN RATS [Abstract]. (Eng.) Berard, A.; Chayvialle, J. A. P.; Pansu, D. (INSERM U 45, Pav. H bis, Hopital E.-Herriot, 69374 Lyon, Cedex 2, France). *Digestion* 16(1/2):203-204; 1977.

See also, 2639, 2698, 2701, 2708, 2715, 2763, 2767, 2863, 2881, 2885, 2931, 2932, 2934, 3004, 3045, 3051, 3065, 3066, 3068, 3071, 3077, 3079, 3086, 3100, 3103, 3105, 3107, 3109, 3115, 3122, 3124, 3125, 3126, 3127, 3128, 3132, 3418, 3424.

SECRETION AND METABOLISM

Pancreas

2749 INTRACELLULAR DIVALENT CATION RELEASE IN PANCREATIC ACINAR CELLS DURING STIMULUS-SECRETION COUPLING. II. SUB-CELLULAR LOCALIZATION OF THE FLUORESCENT PROBE CHLOROTETRACYCLINE. (Eng.) Chandler, D. E.; Williams, J. A. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *J. Cell Biol.* 76(2):386-399; 1978.

Subcellular distribution of the divalent cation-sensitive probe chlorotetracycline (CTC) was observed by fluorescence microscopy in isolated mouse pancreatic acinar cells, dissociated rat hepatocytes, frog rod photoreceptors, and human RBC. In each cell type, areas containing membranes fluoresced intensely while areas containing no membranes (nuclei and zymogen granules) were not fluorescent. Cell compartments packed with rough endoplasmic reticulum or Golgi vesicles (acinar cells) or plasma membrane-derived membranes (rod outer segments) exhibited a uniform fluorescence. In contrast, cell compartments having large numbers of mitochondria (hepatocytes and the rod inner segment) exhibited a punctate fluorescence. Punctate fluorescence was prominent in the perinuclear and perigranular areas of isolated acinar cells during CTC efflux, suggesting that, under these conditions, mitochondrial fluorescence may account for a large portion of acinar cell fluorescence. Fluorometry of dissociated pancreatic acini, preloaded with CTC, showed that the application of the mitochondrial inhibitors antimycin A, NaCN, rotenone, or carbonyl cyanide *m*-chlorophenylhydrazone, or of the divalent cation ionophore A23187 (all agents known to release mitochondrial calcium) rapidly decreased the fluorescence of acini. In the case of mitochondrial inhibitors, this response could be elicited before but not following the loss of CTC fluorescence induced by bethanechol stimulation. Removal of extracellular Ca^{2+} and Mg^{2+} or the addition of EDTA also decreased fluorescence but did not prevent secretagogues or mitochondrial inhibitors from eliciting a further response. These data suggest that bethanechol acts to decrease CTC fluorescence at the same intracellular site as do mitochondrial inhibitors. This effect could be due to release of calcium from either mitochondria or another organelle that requires ATP to sequester calcium.

2750 IN VITRO ACTION OF BOMBESIN ON AMYLASE SECRETION, MEMBRANE POTENTIAL, AND MEMBRANE RESISTANCE IN RAT AND MOUSE PANCREATIC ACINAR CELLS: A COMPARISON WITH OTHER SECRETAGOGUES. (Eng.) Iwatsuki, N.; Petersen, O. H. (Univ. Dundee Medical Sch., Dundee DD1 4HN, Scotland). *J. Clin. Invest.* 61(1):41-46; 1978.

The effect of bombesin on the potential difference and resistance across the pancreatic acinar cell membrane was tested, and the effects were compared with those of other known stimulants. In addition, the dynamic profile of amylase output after bombesin and after acetylcholine (ACh) stimulation was compared. Bombesin caused depolarization of rat or mouse pancreatic acinar cell membrane, reduction of membrane resistance, and a steep rise in amylase output from superfused pancreatic fragments. These effects were similar to those previously described for acetylcholine, cholecystokinin, and gastrin. The dose-response curves for these three effects of bombesin were very similar, with effects being detectable at concentrations of about 30 pM and maximal effects at about 10 nM. The equilibrium potential for the membrane action of bombesin (the membrane potential at which bombesin did not cause any change in membrane potential) was -16 mV. Similar values for equilibrium potential were obtained with acetylcholine, cerulein, and pentagastrin. Bombesin in the higher dose range (10 nM) caused electrical uncoupling of acinar cells within an acinus, i.e., a marked increase in junctional membrane resistance. Similar uncoupling effects were observed after acetylcholine, cerulein, and pentagastrin stimulation. Bombesin acts on the pancreatic acinar plasma membrane in exactly the same way as acetylcholine and cholecystokinin-pancreozymin. The electrical uncoupling caused by stimulation is evidence for an increase in cytosol free calcium ion concentration.

2751 INHIBITORY EFFECT OF VARIOUS CYTOSTATICS AND CYCLOHEXIMIDE ON ACUTE EXPERIMENTAL PANCREATITIS IN RATS. (Eng.) Korbova, L.; Kohout, J.; Malis, F.; Balas, V.; Cizkova, J.; Marek, J.; *et al.* (Faculty General Medicine, Charles Univ., Prague, Czechoslovakia). *Gut* 18(11):913-918; 1977.

The effects of drugs that interfere with nucleic acid and protein syntheses on acute experimental pancreatitis were studied in male Wistar rats. Cycloheximide (0.25 mg/kg, s.c.), 5-azacytidine (4.85 mg/kg, s.c.), and 4-methoxybenzoyl-β-bromoacrylate (Cytembena, 2.0 mg/kg, s.c.) blocked the the development of experimental acute pancreatitis that was mediated by the interstitial administration of 5% bile solution into the pancreas *in vivo.* Six hours after drug treatment, the pathological changes, evaluated macroscopically or using histological sections of the pancreas, were significantly decreased. The drugs affected the amount of abdominal fluid and lowered its lipase activity (to 92%, 70%, and 70% of control for Cytembena, 5-azacytidine, and cycloheximide, resp.) and amylase activity (to 70%, 39%, and 64% of control, resp.). The fact that cycloheximide at low doses is relatively nontoxic may permit its clinical use in pancreatitis.

2752 EXPERIMENTAL SERUM PANCREATITIS: ITS PREVENTION WITH CYCLOPHOSPHAMIDE. (Ger.) Nizze, H. (Institut fur Allgemeine und Spezielle Pathologie, Bereich Medizin der Wilhelm-Pieck-Universitat Rostock, Stremplstr. 14, DDR-25 Rostock 1, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(5/6):241-246; 1977.

The prophylactic effect of cyclophosphamide (CP) on bovine serum-induced pancreatitis was studied in male AB colony mice. The animals were subdivided into 5 groups: group 1 received only bovine serum (1-2 x 0.3 ml/day, 26 total injections, i.p.); groups 2-4 received the same doses of bovine serum along with CP (4, 7, or 11 injections of 2 mg/day i.p.), while group 5 received CP only. The length of the treatment was 13 days. The animals of group 1 developed typical serum pancreatitis (pronounced interstitial lymphoplasmacytic pancreatitis with abundant peritoneal exudate and marked edema of the pancreas). Pancreatitis was not seen in the groups treated with CP. The findings indicate the prophylactic effect of CP against bovine serum-induced pancreatitis.

2753 STRUCTURAL AND FUNCTIONAL STUDIES ON ISOLATED PANCREATIC DUCT FRAGMENTS IN THE RAT [Abstract]. (Eng.) Folsch, U. R.; Fischer, H.; Soling, H. D.; Creutzfeldt, W. (Dept. Medicine, Univ. Gottingen, Gottingen, W. Germany). *Gastroenterology* 72(5, Part 2):1058; 1977.

2754 FINE STRUCTURAL RELATION BETWEEN PANCREATIC EXCRETORY DUCTULES AND INTERCELLULAR SPACES [Abstract]. (Eng.) Papp, M.; Somogyi, J.; Viragh, Sz.; Szabo, D. (Inst. Experimental Medicine, Hungarian Acad. Sciences, H-1450 Budapest P.O.B. 67, Hungary). *Scand. J. Gastroenterol.* 11(Suppl. 41): 89; 1976.

2755 PROPERTIES OF THE CHOLINERGIC MUSCARINIC RECEPTOR OF ISOLATED RAT PANCREAS PLASMA MEMBRANES AND THE ANTIMUSCARINIC EFFECTS OF QUINUCLIDINYL BENZILATE (QNB) [Abstract]. (Eng.) Ng, K. H.; Poirier, G. G.; Morisset, J. (Gastrointestinal Res. Unit, Univ. Sherbrooke, Sherbrooke, Quebec J1K 2R1, Canada). *Gastroenterology* 72(5, Part 2):1108; 1977.

2756 RELATIONS BETWEEN FASTING AND POSTPRANDIAL PANCREATICO-DUODENAL PRESSURES, PANCREATIC SECRETION AND DUODENAL VOLUME FLOW IN THE DOG [Abstract]. (Eng.) Owyang, C.; Dozois, R. R.; DiMagno, E. P.; Go, V. L. W. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1110; 1977.

2757 THE EFFECT OF CHRONIC ALCOHOL INGESTION ON RAT PANCREAS [Abstract]. (Eng.) Reber, H. A.; Johnson, F. E.; Montgomery, C. K.; Carl, W. R.; Wong, M. F. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1117; 1977.

2758 EFFECT OF ATROPINE AND VAGOTOMY ON THE PANCREATIC POLYPEPTIDE RESPONSE TO A MEAL [Abstract]. (Eng.) Taylor, I. L.; Impicciatore, M.; Walsh, J. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1139; 1977.

2759 THE EFFECT OF ATROPINE ON SECRETION RELEASE AND PANCREATIC BICARBONATE SECRETION AFTER DUODENAL ACIDIFICATION IN MAN [Abstract]. (Eng.) Hanssen, L. E. (Ulleval Hosp., Oslo, Norway). *Acta Endocrinol. (Kbh.)* 85(Suppl. 212):195; 1977.

2760 EFFECTS OF CALCITONIN ON PANCREATIC EXOCRINE SECRETION [Abstract]. (Eng.) Dyck, W. P.; Chiprut, R. O. (Scott and White Clinic, Temple, TX 76501). *Gastroenterology* 72(5, Part 2): 1054; 1977.

2761 EXCHANGEABILITY OF THE SECRETORY CALCIUM POOL IN RABBIT PANCREAS [Abstract]. (Eng.) Schreurs, V. V. A. M.; Swarts, H. G. P.; de Pont, J. J. H. H. M.; Bonting, S. L. (Dept. Biochemistry, Univ. Nijmegen, Nijmegen, Netherlands). *Scand. J. Gastroenterol.* 11(Suppl. 41):95; 1976.

2762 EFFECT OF INTRADUODENAL Ca^{++} AND Mg^{++} ON PANCREATIC SECRETION IN DOGS [Abstract]. (Eng.) Swierczek, J. S.; Llanos, O. L.; Teichmann, R. K.; Schafmayer, A.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX). *Gastroenterology* 72(5, Part 2):1138; 1977.

2763 COMPARISON OF PORCINE CHOLECYSTOKININ (CCK) AND SYNTHETIC CAERULEIN ON PANCREATIC, BILIARY, AND GASTRIC SECRETION IN MAN [Abstract]. (Eng.) MacGregor, I. L.; Trupin, J.; Hubsher, J. A. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1092; 1977.

2764 EFFECT OF CHRONIC INJECTION OF COCAINE ON RAT EXOCRINE PANCREAS: A MORPHOLOGICAL AND BIOCHEMICAL STUDY [Abstract]. (Eng.) Morisset, J.; Sakr, F.; Lord, A.; Madarnas, P. (Gastrointestinal Res. Unit, Univ. Sherbrooke, Sherbrooke, Quebec, Canada). *Gastroenterology* 72 (5, Part 2):1105; 1977.

2765 LIPASE AND CO-LIPASE IN INTESTINAL JUICE FOLLOWING A TEST MEAL [Abstract]. (Eng.) Borgstrom, B.; Hildebrand, H. (No affiliation given). *Acta Paediatr. Belg.* 29(2):129; 1976.

2766 ACCELERATED SYNTHESIS DE NOVO OF PHOSPHATIDYLINOSITOLS IN THE RAT EXOCRINE PANCREAS IS NOT NECESSARILY ASSOCIATED WITH ENZYMATIC HYPERSECRETION. SECRETIN AND VASOACTIVE INTESTINAL PEPTIDE (VIP) STIMULATE AMYLASE OUTPUT IN VITRO WITHOUT FAVOURING THIS SYNTHESIS [Abstract]. (Eng.) Calderon, P.; Furnelle, J.; Christophe, J. (Universite Libre de Bruxelles, Laboratoire de Chimie biologique et de la Nutrition, Brussels, Belgium). *Arch. Int. Physiol. Biochim.* 85(2):388-389; 1977.

2767 EFFECT OF PIRENZEPINE, A NEW GASTRIC ACID-INHIBITING AGENT, ON EXOCRINE PANCREATIC SECRETION IN MAN. (Eng.) Brunner, H.; Verita, M.; Polterauer, P.; Grabner, G. (Ordinariat fur Gastroenterologie und Medizinische Computerwissenschaften, Garnisongasse 13, A 1090 Wien, Austria). *Drug Res.* 27(3):684-687; 1977.

2768 SECRETORY GLYCOPROTEINS IN THE RAT EXOCRINE PANCREAS [Abstract]. (Eng.) Vokl, A.; Bieger, W. (Anatomisches Institut der Universitat Heidelberg, Heidelberg Im Neuenheimer Feld 307, W. Germany). *Scand. J. Gastroenterol.* 11(Suppl. 41):96; 1976.

2769 PANCREATIC INSUFFICIENCY ALTERS PROXIMAL, NOT DISTAL MUCOSAL PROTEINS [Abstract]. (Eng.) Kwong, W. (Washington Univ. Sch. Medicine, St. Louis, MO). *Gastroenterology* 72(5, Part 2): 1188; 1977.

2770 DIGESTION OF PROTEINS MEASURED BY POSTPRANDIAL ABSORPTION OF AMINOACIDS IN PIGS SUBJECTED TO DISCONTINUOUS PANCREATIC DERIVATION [Abstract]. (Eng.) Rerat, A.; Corring, T. (INRA 78350 Jouy en Josas, France). *Scand. J. Gastroenterol.* 11(Suppl. 41):93; 1976.

2771 SECRETIN: LACK OF RESPONSE TO ORAL FEEDING [Abstract]. (Eng.) O'Connor, F. A.; Buchanan, K. D.; Henry, W.; Calvert, H. (Dept. Medicine, Queen's Univ., Belfast, Northern Ireland). *Gut* 18(5):A415; 1977.

2772 THE EFFECT OF SOMATOSTATIN (SST) ON ENDOGENOUS RELEASE OF SECRETIN AND PP IN DOG [Abstract]. (Eng.) Gyr, K.; Hacki, W.; Kayasseh, L.; Girard, J.; Rittmann, W. W.; Stalder, G. A. (Kantonsspital Basel, Basel, Switzerland). *Acta Endocrinol.* 85(Suppl. 212):107; 1977.

2773 SULFATED COMPOUNDS IN THE GUINEA PIG PANCREAS [Abstract]. (Eng.) Reggio, H.;

Palade, G. E. (Yale Univ. Medical Sch., 333 Cedar St., New Haven, CT 06510). *Scand. J. Gastroenterol.* 11(Suppl. 41):92; 1976.

2774 DETERMINATION OF HUMAN PANCREATIC CATIONIC TRYPSIN IN SERUM [Abstract]. (Eng.) Geokas, M. C.; Largman, C.; Brodrick, J. W. (Martinez Veterans Admin. Hosp., Davis, CA). *Gastroenterology* 72(5, Part 2):1061; 1977.

2775 PREVENTION OF ENTEROKINASE INDUCED ACUTE PANCREATITIS WITH TRASYLOL AND SOYBEAN TRYPSIN INHIBITOR [Abstract]. (Eng.) Mann, N. S.; Kadian, R. S.; Narenderan, K. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1097; 1977.

2776 PANCREATIC SECRETION IN HAMSTERS WITH PANCREATIC DUCT OBSTRUCTION [Abstract]. (Eng.) Reber, H. A.; Johnson, F. E.; Wong, M. F.; Carl, W. R. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1117; 1977.

2777 PANCREATIC HYPERSECRETION FOLLOWING SMALL BOWEL RESECTION. POSSIBLE ROLE IN INTESTINAL ADAPTATION [Abstract]. (Eng.) Gelinas, M. D.; Morin, C. L.; Ling, V.; Bourassa, D. (Hopital Ste-Justine, Universite de Montreal, Montreal, Quebec, Canada). *Gastroenterology* 72(5, Part 2): 1061; 1977.

See also, 2719, 2745, 2947, 3010, 3216, 3223, 3228.

SECRETION AND METABOLISM

Hepatobiliary Tract

2778 STUDIES IN PHARMACOKINETICS AND TOLERANCE OF SUBSTANCES TEMPORARILY RETAINED IN THE LIVER BY MICROSPHERE EMBOLIZATION. (Eng.) Lindell, B.; Aronsen, K. F.; Nosslin, B.; Rothman, U. (Malmo General Hosp., Malmo, Sweden). *Ann. Surg.* 187(1):95-99; 1978.

The effect of microsphere embolization on the retention of inulin in the liver and on the toxicity of 5-fluorouracil (5-FU) was studied in male Wistar-Fur rats. The test substances were injected into the common hepatic artery through a retrograde catheter in the gastroduodenal artery. The injection of 0.5 ml of inulin (1.96 mg/ml aqueous solution) alone into the common hepatic artery produced a rapid elevation of the inulin blood concentration to a maximum of 50-55 µg/ml in 1 min; the concentration then rapidly fell to a level of about 10 µg/ml after 20 min. In contrast, when inulin was injected in combination with 42 x 10^4 degradable microspheres (19 ± 3.1 µm), the initial high peak in inulin blood concentration failed to appear, and the maximum blood concentration reached was only 20-25 µg/ml (p=0.01). The inulin concentration curve in the blood 20 min after the administration of inulin and microspheres was almost identical to the concentration found when inulin was injected alone. The injection of inulin with microspheres also led to a significantly (1% level) delayed excretion of inulin with urine; after 35 min, only 20% of the administered dose was found in the urine compared to 60% of the administered dose when inulin alone was injected. During the first 30 min after the injection of inulin and microspheres, the mean inulin concentration in the liver was raised by 42% (p=0.05) compared to when inulin was injected alone. Leukocytopenia, which resulted from the injection of 5-FU (300 mg/kg) alone into rats, was less marked when 5-FU was injected with 126 x 10^4 microspheres and was reversed at days 4 and 9 when a significantly (1% level) higher number of circulating WBC was found than when 5-FU was injected alone. The survival rate of rats given 5-FU alone was 22% compared with 75% when the drug was injected with microspheres (p=0.01). The increased tolerance to 5-FU was probably due to a prolonged first pass effect when the substance was temporarily retained in the liver by microsphere embolization.

2779 ENZYMOLOGY OF HUMAN ALCOHOL METABOLISM. (Eng.) Li, T. K. (No affiliation given). *Adv. Enzymol.* 45:427-483; 1977.

The properties of human liver alcohol dehydrogenase and aldehyde dehydrogenase are reviewed, their role in the physiology of alcohol elimination is assessed, and the findings compared with those from experimental animals. A specific affinity chromatography procedure has been developed that collectively purifies the many molecular forms of alcohol dehydrogenase in high yield. Studies with such preparations have revealed that the enzyme is a dimeric molecule of 85,000 daltons, containing 4 equivalents of zinc/mol protein. Several NAD^+-dependent, unspecific aldehyde dehydrogenases have been found in mammalian livers, some with high K_ms and other with low K_ms for acetaldehyde. The subcellular distribution of these enzymes has been determined, and the mitochondrial low-K_m aldehyde dehydrogenase has been identified as the principal enzyme responsible for acetaldehyde elimination in rats. A soluble form of aldehyde dehydrogenase, with a low K_m for acetaldehyde, has been isolated from human liver homogenates, but its subcellular location and role have not been established. It is postulated that the molecular heterogeneity of alcohol dehydrogenase in liver contributes to individual differences in alcohol-metabolizing capacity; the atypical phenotype of alcohol dehydrogenase has been postulated to underlie alcohol sensitivity. The decreased alcohol dehydrogenase activity seen in cirrhosis may reflect changes in the synthesis, degradation, metal binding, or activity of zinc metalloenzymes. The study of alcohol dehydrogenase and other zinc metalloenzymes in patients with alcoholic liver disease should aid in understanding the cellular pathology and pathogenesis of alcoholic cirrhosis.

2780 INCREASED HEPATIC OXYGENATION FOLLOWING ETHANOL ADMINISTRATION. (Eng.) Shaw, S.; Heller, E. A.; Friedman, H. S.; Baraona, E.; Lieber, C. S. (Bronx Veterans Admin. Hosp., 130 W. Kingsbridge Rd., New York, NY 10468). *Proc. Soc. Exp. Biol. Med.* 156(3):509-513; 1977.

The effects of ethanol on hepatic oxygenation were measured by hepatic vein catheterization in the baboon. Chronic alcohol administration (50% of total caloric intake for 1-4 yr) resulted in slightly lower oxygen tension in the hepatic vein, but not ischemia, when measured after an overnight fast when alcohol was no longer present in the blood. The i.v. administration of ethanol (1.75 g/kg) resulted in an increase in hepatic vein oxygen tension regardless of prior exposure to alcohol or the presence of liver disease. The increased oxygen tension after alcohol was associated with a marked increase in hepatic blood flow. These data in conjunction with the observation of progressive liver injury in the alcohol-fed animals support the concept that alcoholic liver injury can develop despite unimpaired hepatic oxygenation.

2781 PROBING THE ACTIVE SITE OF LIVER ALCOHOL DEHYDROGENASE. (Eng.) Dutler, H. (Laboratorium fur Organische Chemie, ETH Universitatstrasse 6, CH-8006 Zurich, Switzerland). *Biochem. Soc. Trans.* 5(3):617-620; 1977.

Kinetic and modeling studies designed to determine the active site of liver alcohol dehydrogenase are described. The reduction of racemic 2-, 3-, and 4-alkylcyclohexanones with methyl, ethyl, isopropyl, and tertiary-butyl alkyl groups was studied on a preparative scale and under conditions where the coenzyme NADH was continuously regenerated by auxiliary enzymes (glucose-6-phosphate dehydrogenase and aldolase). Product formation was followed by gas chromatography combined with determination of enantiomer composition by nuclear magnetic resonance spectroscopy of the α-methoxy-α-trifluoromethylphenylacetyl esters of the product alcohols. The kinetic method for determining at which position of the cyclohexanone ring an alkyl group leads to favorable or unfavorable intermolecular interactions with the enzyme involved reducing the pairs of enantiomeric alkylcyclohexanones to the four possible alcohols in each case. The kinetically obtained information was then compared with modeling study results to identify groups involved on the side of the active-site pocket of the enzyme. The active-site pocket, including the nicotinamide moiety of the coenzyme, was built with Kendrew-type models, and models of the alkylcyclohexanols formed as products were placed into the active-site pocket such that their hydroxyl oxygen atom appeared in the position where the water oxygen atom was observed in the apoenzyme. The alkylcyclohexanol models were allowed to change their orientation within geometric constraints until full agreement was achieved between the interactions observed in the model and those determined kinetically. In the resulting model, the cyclohexanol rings of all products were superimposed and therefore showed the same orientation relative to the nicotinamide moiety of the coenzyme. Excellent agreement between the modeling study and the kinetic studies was obtained, suggesting that the model of the enzyme-product complex discloses all of the interesting structural features of the enzyme-substrate complex.

2782 SERUM ENZYME ACTIVITIES IN RATS WITH CHRONIC LIVER DAMAGE. COMMUNICATION 2: EFFECT OF ALLYL ALCOHOL. (Ger.) Neubauer, J.; Schieke, S.; Schulz, I.; Skorka, G.; Bien, E. (Institut fur Pharmakologie und Toxicologie, Humboldt-Universitat zu Berlin, Berlin, E. Germany). *Pharmazie* 32(7):406-409; 1977.

The effect of a 20-week treatment with allyl alcohol (0.02 and 0.04 ml/kg/day in 1% and 2% aqueous solutions) on the activities of certain serum enzymes (SGOT, SGPT, glutamate dehydrogenase, lactate dehydrogenase, leucine aminopeptidase, and alkaline phosphatase) was studied in male Wistar rats aged 12-14 weeks at the beginning of the experiment. Allyl alcohol was administered by a probang; the animals received food and water *ad libitum*. The control animals received water only. Severe diarrhea with fatal outcome was observed in 4/42 animals treated with 0.04 ml/kg doses, but there were no visible changes in the other animals. Allyl alcohol caused a significant but transient increase in SGPT (from 28 IU/l to a maximum 53 IU/l after 4 weeks of treatment with the 0.02 ml/kg dose, and to 51 IU/l after 8 weeks of treatment with the 0.04 ml/kg dose) and in glutamate dehydrogenase activity (from 5.4 IU/l in the controls to 18.1 IU/l after 4 weeks of treatment with the 0.02 ml/kg dose, and to 26 IU/l after 8 weeks of treatment with the 0.04 ml/kg dose). The findings indicate the relevance of glutamate dehydrogenase determinations in the detection of liver damage in experimental animals.

2783 EFFECT OF GLUCOCORTICOIDS ON AMINO ACID TRANSPORT IN ISOLATED RAT HEPATOCYTES. (Eng.) Le Cam, A.; Freychet, P. (INSERM U-145, Faculte de Medecine [Pasteur], Chemin de Vallombrose, 06034 Nice Cedex, France). *Mol. Cell. Endocrinol.* 9(2):205-214; 1977.

The effects of glucocorticoids on neutral amino acid transport were studied in freshly prepared suspensions of isolated hepatocytes from adult rat. Cortisol and dexamethasone at 10 μM stimulated the active transport of α-aminoisobutyric acid by about 40% by increasing the influx. The onset of effect was preceded by a lag period of about 1 hr. Cortisol (ED_{50}≈2 μM) was 10-20 times less potent than synthetic analogs. Glucocorticoids increased the V_{max} of transport without affecting the K_m. Actinomycin D and cycloheximide virtually abolished this effect. The glucocorticoid effect involved predominantly the A system of transport. The effect was additive with that of glucagon, insulin, and catecholamines.

2784 INDIVIDUAL BILE ACIDS IN PORTAL VENOUS AND SYSTEMIC BLOOD SERUM OF FASTING MAN. (Eng.)

Ahlberg, J.; Angelin, B.; Bjorkhem, I.; Einarsson, K. (Serafimerlasarettet, S-112 83 Stockholm, Sweden). *Gastroenterology* 73(6):1377-1382; 1977.

The serum concentrations of cholic acid (C), chenodeoxycholic acid (CD), and deoxycholic acid (D) were determined, using a highly specific gas chromatographic-mass spectrometric technique, in peripheral venous and portal venous blood from 10 otherwise healthy patients undergoing elective cholecystectomy. The mean C content of the peripheral venous serum was 0.49 ± 0.16 μM; the mean CD and D contents were 1.55 ± 0.32 and 1.44 ± 0.57 μM, resp. Arterial serum, obtained from five of the subjects, did not show any differences in bile acid concentrations compared to venous serum. In contrast, the portal venous content of each bile acid was several-fold greater, 6.14 ± 1.20 μM of C, 8.40 ± 1.84 μM of CD, and 6.18 ± 2.27 μM of D. The hepatic uptake of C was estimated to be about 90%, whereas that of CD and D was lower, about 70%. This difference in hepatic uptake between the individual bile acids was reflected in the relative composition of the total bile acids, which was 30:39:31 (C:CD:D) in portal venous serum and 13:50:37 in peripheral serum. Compared to common duct bile obtained simultaneously, the portal vein contained a greater proportion of CD. It is suggested that the higher fasting level of CD compared to C in peripheral serum may result from the combination of a lower fractional hepatic extraction and a higher portal venous input to the systemic circulation.

2785 SERUM BILE ACID LEVELS: A COMPARTMENTAL MODEL FOR THE DYNAMICS OF THE ENTEROHEPATIC CIRCULATION. (Eng.)

Hoffman, A. F.; La Russo, N. F.; van Berge-Henegouwen, G. P. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 151-156; 1977.

A multicompartmental model is proposed for the hepatic part of the enterohepatic circulation of bile acids. The model postulates a well-mixed sinusoidal compartment, one constant fraction passes into the hepatocyte and the remainder enters the peripheral plasma compartment. The flux of any bile acid entering the peripheral plasma compartment at any moment is equal to (1-first pass hepatic clearance) x that bile acid flux to the liver. The total spillover of bile acids into the peripheral plasma compartment is the sum of the individual spillovers. This model explains why the level of serum bile acids in peripheral blood rises postprandially, why interruption of the enterohepatic circulation causes a fall in serum bile acids, and why fasting-state serum bile acids are enriched in chenodeoxycholic acid when compared to fasting-state biliary bile acids.

2786 INFLUENCE OF CHEMICAL STRUCTURE ON HEPATOCELLULAR UPTAKE OF BILE ACIDS. (Eng.)

Reichen, J.; Preisig, R.; Paumgartner, G. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 113-123; 1977.

The kinetics of uptake of ^{14}C-labeled cholic, taurocholic, and chenodeoxycholic acids were studied in the perfused rat liver by the multiple-indicator dilution technique. All three bile acids exhibited saturation kinetics. The maximal uptake velocity (V_{max}) was similar for the trihydroxy bile acids taurocholate (20.8 nmol/sec/g liver) and cholate (24.9 nmol/sec/g liver); it was only half this value for the dihydroxy bile acid, chenodeoxycholate (11.4 nmol/sec/g liver). The apparent half-saturation constant, K_m, was 100% higher for the unconjugated bile acid cholate (526 nmol/g liver) than for its conjugated analog, taurocholate (258 nmol/g); it was similar for chenodeoxycholate (236 nmol/g) and for taurocholate. It is assumed that the difference in the apparent K_m reflects intrinsic differences in the affinity of different bile acids for the hepatic carrier. The findings suggest that (1) the hepatic uptake of chemically different bile acids is compatible with carrier-mediated transport, (2) the maximal uptake velocity is higher for trihydroxy than for dihydroxy bile acids and is not influenced by conjugation, and (3) the affinity of bile acids for the transport system is higher for dihydroxy than for trihydroxy bile acids and higher for conjugated than for unconjugated bile acids.

2787 VARIATION IN BILE COMPOSITION AND SERUM LIPIDS DURING THE MENSTRUAL CYCLE. (Eng.)

Low-Beer, T. S.; Wicks, A. C. B.; Heaton, K. W.; Durrington, P.; Yeates, J. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 183-190; 1977.

To determine if there are fluctuations in bile cholesterol saturation and consequently in the risk of forming gallstones during the cycle, biliary lipid composition and fasting serum cholesterol and triglyceride levels were measured during the normal menstrual cycle in 11 healthy, regularly menstruating women not taking oral contraceptives. Measurements were made the day after bleeding had stopped, at midcycle, and 8-9 days after midcycle. Cholesterol saturation of bile, and therefore the risk of developing gallstones, was greater 8-9 days after midcycle than at the end of bleeding. Serum triglyceride and cholesterol levels fell over the 8-9 days after midcycle; triglyceride levels were 0.59 ± 0.07, 0.67 ± 0.06, and 0.52 ± 0.04 mM and cholesterol levels were 3.97 ± 0.01, 3.92 ± 0.16, and 3.63 ± 0.16 mM at the end of menstruation, at midcycle, and at 8-9 days after midcycle, resp. These changes in serum and biliary lipid composition are probably due to a direct effect of sex hormones on the liver.

2788 REAPPRAISAL OF CHOLESTEROL SOLUBILIZATION IN BILE SALT-LECITHIN SOLUTION AND THE STABILITY OF BILE. (Eng.) Furusawa, T.; Nakama, T.; Itoh, H.; Hisadome, T. (Faculty Medicine, Kyushu Univ., 3-1-1 Maidashi, Higashi-ku, Fukuoka-shi, 812 Japan). *Gastroenterol. Jpn.* 12(4):253-262; 1977.

Cholesterol solubility in aqueous solutions containing lecithin and bile salts in a 1:3 ratio by weight was studied. Both the rate and magnitude of cholesterol solubilization were found to be markedly greater in systems where a cholesterol and lecithin mixture was solubilized by the bile salt than in systems where cholesterol crystals were solubilized in an aqueous bile salt-lecithin solution. An almost linear relation was found between the quantity of solubilized cholesterol and the bile salt concentration when sodium deoxycholate was used as the bile salt; however, a slight deviation from a straight line was observed at lower bile salt concentrations (75 mM or less) when systems employing sodium cholate, sodium chenodeoxycholate, or sodium cholate-deoxycholate as bile salts were used. Thus, a partial straight line was drawn by the method of least squares, and the slope of the graph representing quantity of solubilized cholesterol as a function of bile salt concentration was calculated. The values of the slope for cholate, chenodeoxycholate, deoxycholate, and mixed equimolar cholate-deoxycholate systems were 5.85×10^{-2}, 7.60×10^{-2}, 9.50×10^{-2}, and 7.17×10^{-2}, resp. This order of values was the same as that obtained for bile salt-cholesterol systems without lecithin; however, the values obtained for the systems containing lecithin showed that the solubilizing power of the bile salt was intensified by the addition of lecithin in each system. The solubilized cholesterol:bile salt ratio was also graphed as a function of bile salt concentration, and the saturability of cholesterol solubilization in bile was illustrated when reported data on bile salts and cholesterol in human and animal bile were plotted on this graph.

2789 INTERACTION BETWEEN DRUGS AND CHOLESTEROL METABOLISM IN RAT LIVER SUBCELLULAR FRACTIONS. (Eng.) Mitropoulos, K. A.; Balasubramaniam, S. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 17-24; 1977.

The activities of cholesterol 7α-hydroxylase, ethylmorphine demethylase, and the microsomal concentration of cytochrome P-450 were compared in rat livers subsequent to the following *in vivo* treatments: phenobarbitone (100 mg/kg, i.p.) given on alternate days over 6 days; L-thyroxine (500 µg/kg, i.p.) given daily for 7 days; cholestyramine (5% in the diet) fed for 5 days; or thyroidectomy, portacaval anastomosis, or adrenalectomy performed 2 weeks before the experimental measurements. There was no correlation between the activity of cholesterol 7α-hydroxylase and that of ethylmorphine demethylase or the content of cytochrome P-450, but there was a close correlation between ethylmorphine demethylase activity and the concentration of cytochrome P-450. The presence of ethylmorphine inhibited the activity of cholesterol 7α-hydroxylase and the presence of cholesterol inhibited the activity of ethylmorphine demethylase. The activity of lanosterol 14α-demethylase was also inhibited in the presence of drugs such as ethylmorphine or aniline. Triarimol (α-[2,4-dichlorophenyl]-α-phenyl-5-pyrimidine-methanol), a drug that interacts with cytochrome P-450, was a potent inhibitor of cholesterol 7α-hydroxylase, lanosterol 14α-demethylase, and ethylmorphine demethylase activities. It is possible that liver microsomes contain a number of P-450s, each one specific for a given substrate.

2790 ROLE OF DIETARY CHOLESTEROL ON THE EFFECT OF CHENODEOXYCHOLIC ACID ON BILIARY LIPIDS. (Eng.) Coyne, M. J.; Bonorris, G. G.; Chung, A.; Cove, H.; Schoenfield, L. J. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, MD.: University Park Press): 203-209; 1977.

To determine the effects of differing concentrations of dietary cholesterol on the ability of chenodeoxycholic acid (CDC) to inhibit hepatic hydroxy-methyl-glutaryl-CoA reductase (HMG-CoAR) male golden Syrian hamsters were fed one of the following diets for 1 month: standard diet and CDC, high cholesterol diet with and without CDC, or cholesterol-free diet with and without CDC. The high cholesterol diet increased the concentration of biliary cholesterol and the biliary saturation index from the values observed in hamsters fed the standard diet but had no effect on bile acid or phospholipid concentrations. CDC administration significantly decreased the concentration of biliary cholesterol and the biliary saturation index from levels seen in hamsters on the standard diet and on the high cholesterol diet but had no effect on biliary acid or phospholipid concentrations. CDC had no effect on the concentration of biliary lipids or the biliary saturation index in the hamsters on the cholesterol-free diet. The hamsters receiving the high cholesterol diet and CDC had an HMG-CoAR activity less than that seen in hamsters receiving CDC and a standard diet. CDC administration to hamsters fed the cholesterol-free diet resulted in HMG-CoAR activity greater than the activity associated with CDC-treated hamsters on the standard diet. It is concluded that dietary cholesterol is necessary for optimum CDC inhibition of HMG-CoAR. Dietary cholesterol alterations may be one cause for the failure of CDC dissolution of gallstones because high cholesterol and cholesterol-free diets prevent the maximum CDC decrease of the biliary saturation index.

2791 CONVERSION OF 5β-CHOLESTANE INTERMEDIATES (3α,7α,26-TRIOL,3α,7α,25-TRIOL AND 3α,7α-DIOL) TO CHOLIC AND CHENODEOXYCHOLIC ACIDS IN MAN. (Eng.) Vlahcevic, Z. R.; Schwartz, C. C.; Cohen, B. I.; Gregory, D. H.; Halloran, L. G.; Kuramoto, T.; *et al. In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 49-58; 1977.

The efficiency of the conversion of the 5β-cholestane derivatives 3α,7α,26-triol,3α,7α-diol (both ^{3}H-labeled), and 3α,7α,25-triol (^{14}C-labeled) to cholic acid and chenodeoxycholic acid (CDCA) was examined by mixing the derivatives with albumin and giving the mixtures i.v. to postcholecystectomized patients who had balloon occludable T-tubes. The patients had acholic stools and no deoxycholic acid was found in bile, suggesting a completely interrupted enterohepatic cycle. The transformation of the injected labeled precursors was evaluated from the secretion rates of cholic acid and CDCA, the value of bile secreted per time period, and the specific activities of these respective bile acids. 5β-Cholestane-3α,7α,26-triol was efficiently converted to cholic acid and CDCA. The formation of cholic acid from this precursor suggests that hydroxylation at the 12 position is not hindered by the presence of a hydroxyl group at C-26. The efficient conversion of 5β-cholestane-3α,7α,26-triol and -3α,7α-diol into both cholic acid and CDCA in proportions similar to those observed for endogenously synthesized bile acids suggests that these 5β-cholestane derivatives may be major intermediates in the synthesis of cholic acid and CDCA. 5β-Cholestane-3α,7α,25-triol was poorly converted to bile acids, suggesting that this intermediate can be hydroxylated at the C-12 position to a limited extent. The quantitative contribution of this pathway to cholic acid synthesis is probably not very significant.

2792 TECHNIQUES FOR STUDYING LITHOCHOLIC ACID METABOLISM IN MAN. (Eng.) Allan, R. N.; van Berge-Henegouwen, G. P.; Hoffman, N. E.; Hofmann, A. F. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 161-165; 1977.

Factors involved in the development of techniques for accurate studies of lithocholic acid metabolism in man are considered. Simultaneous kinetic studies in gallstone patients and healthy volunteers indicated that (24-^{14}C)-lithocholate is a better label than (11,12-^{3}H)-lithocholate because it is more stable during enterohepatic cycling. Early bile acid pool sampling is essential for kinetic studies to avoid underestimating the specific activity at zero time and thus overestimating the pool size. Measurement of radioactivity in bile samples is done using standard methods. Preparative steps must include complete recovery of bile acid sulfates; complete hydrosolvolysis can be achieved by mild alkaline hydrolysis in nickel bombs using nordeoxycholic acid as an internal standard. Because of the complex kinetics involved, the most accurate estimates of the input and size of the total exchangeable lithocholate pool were obtained by using the Hamilton-Stewart equations. Lithocholate biotransformation studies are best done by i.v. administration of labeled bile acid with determination of the chemical form of radioactivity in bile samples by thin-layer chromatography. These techniques have been used to demonstrate that, during chenic acid ingestion, the lithocholate input and the size of the exchangeable pool in gallstone patients is four to five times that observed in healthy controls.

2793 THE METABOLISM OF URSODEOXYCHOLIC ACID IN MAN. (Eng.) Salen, G.; Fedorowski, T.; Colallilo, A.; Tint, G. S.; Mosbach, E. H. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 167-172; 1977.

The metabolism of ursodeoxycholic acid (UDCA) was investigated in man by feeding five subjects 1 g/day UDCA and another five subjects 1 g/day chenodeoxycholic acid (CDCA), all for 3 weeks. Biliary and fecal bile acid compositions were determined, biliary cholesterol saturation was measured, and the pool size and production rate of ursodeoxycholic acid was calculated after (24-^{14}C)-ursodeoxycholic acid was given i.v. as a pulse-label. Two weeks after administration, UDCA was the major biliary bile acid; the concentration of lithocholic acid was unchanged. When CDCA was given, 64% of the bile acids were CDCA and the concentration of lithocholic acid in the bile doubled. Following CDCA treatment, most of the fecal bile acids were present as their bacterial metabolites. Fewer bacterial derivatives were present in the feces when UDCA was given. This finding suggests that intestinal bacteria metabolize the 7β-hydroxy group of UDCA differently than the 7α-hydroxy group of CDCA. This difference in metabolism results in the formation of less lithocholic acid and fewer side-effects (stool frequency and serum transaminase levels) following UDCA treatment. During UDCA treatment, cholesterol saturation in the bile decreased significantly suggesting that UDCA, like CDCA, may be an effective litholytic agent.

2794 PRODUCTION OF COLLAGEN AND ACIDIC GLYCOSAMINOGLYCANS BY AN EPITHELIAL LIVER CELL CLONE IN CULTURE. (Eng.) Sakakibara, K.; Umeda, M.; Saito, S.; Nagase, S. (Inst. Medical Science, Univ. Tokyo, Shirokanedai, Minatoku, Tokyo, 108, Japan). *Exp. Cell Res.* 110(1):159-165; 1977.

Experiments were carried out to determine whether a rat liver cell clone, which is known to produce collagen fibers *in vitro*, also produces glycosaminoglycans. The epithelial cell line produced collagen *in vitro* as early as 10 days after inoculation of the cells. The amount of collagen in the cell layers increased linearly with time after the cultures reached a saturation density. Two kinds of acidic glycosaminoglycans, hyaluronic acid and dermatan sulfate, were detected from the same cell layers by the combined method of electrophoresis and enzymic hydrolysis. Quantitative analysis by densitometry with an electrophorogram showed a rapid increase of both sulfated and nonsulfated glycosaminoglycans occurring concurrently with an accumulation of collagen. Histochemical stainings revealed that the majority of Alcian blue-positive materials was located outside the cells, where argyrophilic fibers could be found. These data are consistent with results obtained from biochemical experiments on cirrhotic rat livers, suggesting that liver parenchymal cells are responsible for an accelerated production of both collagen and glycosaminoglycans in liver cirrhosis.

2795 THE ROLE OF THE LIVER IN BIOSYNTHESIS OF THE NONVITAMIN K-DEPENDENT CLOTTING FACTORS. (Eng.) Workman, E. F., Jr.; Lundblad, R. L. (Dept. Pathology and Biochemistry, Univ. North Carolina, Chapel Hill, NC). *Semin. Thromb. Hemostas.* 4(1):15-28; 1977.

The role of the liver in the biosynthesis of the procoagulant proteins (factor V, VIII, XI, XII, and XIII, fibrinogen, prekallikrein, and high molecular weight kininogen), of proteins involved in fibrinolysis (plasminogen and plasminogen activator), and of the inhibitors, antithrombin III, α_2-macroglobulin, and α_1-antitrypsin is reviewed. The liver is the primary site of fibrinogen synthesis. There is evidence to support the role of fibrinogen degradation products in enhancing fibrinogen synthesis in some animal systems. Free fatty acid/albumin ratio may play a role in the increased fibrinogen synthesis observed during disseminated intravascular coagulation. Factor VIII appears to be synthesized primarily in the liver endothelial cells. Factor XIII activity (a-chain) may be synthesized at a variety of sites (megakaryocytes, spleen, uterus), while b-chain synthesis is probably confined to the liver. Factor V also appears to be synthesized by the liver, as evidenced by the decrease of its plasma concentration in patients with liver damage and its presence in perfusates from isolated rat liver. It is likely that the synthesis of factors XIII and XI, prekallikrein, and high molecular weight kininogen occur in the liver, but no direct evidence is available. Plasma antithrombin III levels decreased in all studied cases of severe hepatic failure both with and without evidence of disseminated intravascular coagulation, suggesting that the liver participates in antithrombin III synthesis. Embryonic hepatic tissue synthesizes α_2-macroglobulin, but the plasma level of this inhibitor is elevated in patients with severe liver disease, suggesting the existence of extrahepatic sites of synthesis. α_1-Antitrypsin also appears to be synthesized at least in part by the liver.

2796 EFFECT OF ESTROGEN ON LIVER DAMAGE. (Eng.) Inokawa, H. (Nihon Univ. Sch. Medicine, Nihon, Japan). *Nihon Univ. J. Med.* 18(2):75-89; 1976.

The effects of estrogen and ACTH fatty degeneration and fibrosis of the liver were studied in female rats receiving a choline-deficient diet. Both castrated and noncastrated rats were injected (3 times/week, i.p.) with estrogen (0.02% or 0.2% solution given in doses of 0.05 ml or 0.1 ml per 100 g body weight) or ACTH (IU/10 ml solution, dose of 0.05 ml/100 g body weight). The animals were sacrificed 1 or 2 months after the start of the study. The estrogen had a mild protective effect against fatty liver, which is induced by a choline deficient diet but it appeared to induce liver fibrosis. ACTH, however, protected against liver fibrosis in noncastrated rats but increased the development of fatty liver in rats on the choline-deficient diet. Estrogen suppressed the production of serum mucoprotein.

2797 REVERSAL OF ETHINYL ESTRADIOL-INDUCED HYPOCHOLESTEROLEMIA AND CHOLESTASIS BY TRITON WR-1339. (Eng.) Davis, R. A.; Showalter, R. B.; Kern, F., Jr. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October 1976.* (Baltimore, MD: University Park Press): 25-31; 1977.

To examine hepatic lipid composition in relation to estrogen-impaired liver function, male Sprague-Dawley rats were injected s.c. daily with ethinyl estradiol (5 mg/kg/day) for 5 days to produce maximal hypocholesterolemia, after which they were injected with Triton WR-1339 (22.5 mg/100 g). Some rats were killed 15 hr after Triton WR-1339 injection for determination of hepatic cholesterol concentration and microsomal cholesterol acyl-CoA transferase; other rats were used for bile flow measurements. Ethinyl estradiol caused hepatic cholesterol concentrations to double but had no effect on free cholesterol levels. Triton WR-1339 reduced the concentration of hepatic cholesterol esters to normal levels. Addition of Triton WR-1339 to hepatic microsomal fractions from ethinyl estradiol-treated rats inhibited cholesterol esterification in a log-linear dose relationship, suggesting that Triton lowers hepatic cholesterol ester concentrations by inhibiting the activity of this enzyme. The rate of bile flow, which was reduced by 50% in ethinyl estradiol-treated rats, was restored to control values by Triton. It is concluded that Triton WR-1339 reverses estrogen-induced hepatic cholesterol ester accumulation and also reverses two impaired hepatic functions: hypocholesterolemia and decreased bile salt independent bile flow. The data support the concept that, in part, estrogens alter hepatic function through the pleiotropic effects secondary to increased microsomal cholesterol acyl-CoA transferase activity.

2798 THE EFFECT OF SECRETIN AND CHOLECYSTOKININ-PANCREOZYMIN ON THE SECRETION OF BILE IN

THE ANAESTHETIZED RABBIT. (Eng.) Esteller, A.; Lopez, M. A.; Murillo, A. (Dept. Animal Physiology, Univ. Granada, Granada, Spain). *Q. J. Exp. Physiol.* 62(4):353-359; 1977.

The effects of secretin and cholecystokinin-pancreozymin (CCK-PZ) on the secretion of bile in anesthetized rabbits were studied. Single injections of secretin (5.0 U/kg, i.v.) significantly increased the flow of bile irrespective of whether the cystic duct was free or had been tied. A sustained increase in bile flow was obtained by the continuous infusion of secretin. CCK-PZ was effective in increasing the bile flow in doses of 1.0 U/kg. Much of the effect could be attributed to contraction of the gallbladder, but a significant increase in flow could still be elicited after ligation of the cystic duct. These findings strongly suggest that the biliary secretion in rabbits is not as different from the general pattern as has previously been suggested.

2799 CYSTIC CHOLANGIOFIBROSIS OF THE LIVER. (Eng.) Dominis, M.; Damjanov, I. (Bolnica O. Novosel, Zajeeva ul. 19, Zagreb, 41000 Yugoslavia). *Arch. Geschwulstforsch.* 47(7):661-669; 1977.

Hepatic cysts in rats fed acetylaminofluorene were studied ultrastructurally to further characterize the lesion and its histogenesis. The cysts were lined by cuboidal or flattened epithelium or both and resembled bile ductular cells. Most of the flattened cells showed adaptive and degenerative changes indicative of pressure atrophy. The cuboidal cells lining the smaller ducts showed ultrastructural signs of activity. Similar "active" cells were seen in the outpouchings of the larger cysts. These data indicate that the cysts are of cholangiocellular origin. Ultrastructurally, the cells forming the cysts showed no signs of anaplasia and more likely represent the end point of bile ductular proliferation rather than a stage in the development of biliary neoplasia.

2800 ULTRASTRUCTURAL ASPECTS OF BILIRUBIN ENCEPHALOPATHY IN COCHLEAR NUCLEI OF THE GUNN RAT. (Eng.) Jew, J. Y.; Williams, T. H. (Dept. Anatomy, Univ. Iowa, Iowa City, IA 52240). *J. Anat.* 124(3):599-614; 1977.

Ultrastructural changes occurring in the cochlear nuclei of Gunn rats with bilirubin encephalopathy were studied. Twenty-one homozygous Gunn rats (2 days to 7 months old) with conspicuous jaundice and/or symptoms of central nervous system disease were compared with normal Sprague-Dawley rats and heterozygous Gunn rats of appropriate age. Blocks containing the ventral cochlear nuclei and the dorsal cochlear nucleus were removed from the fixed brain and processed for electron microscopy by staining with uranyl acetate and lead citrate. Ultrastructural abnormalities were observed in all age groups of homozygous rats, being least severe in the 2- to 4-day old animals. Mitochondrial alterations were observed in 2-day-old rats. The amount of alpha and beta glycogen particles in mitochondria of large neurons increased with age. Some large ex-mitochondrial sacs in close proximity to glycogen filled vacuoles were observed. Dilated profiles of rough endothelial reticulum also contained glycogen particles. Elaborated myelin figures surrounded tongues of cytoplasm and vacuoles and degenerative elements were observed in the cytoplasm of some large neurons. It seems very likely that, in bilirubin encephalopathy, bilirubin affects primarily membrane functions, especially in the mitochondria.

2801 THE EFFECT OF D-GALACTOSAMINE ON LCAT SECRETION AND ULTRASTRUCTURE OF ISOLATED RAT HEPATOCYTES. (Eng.) Nordby, G.; Schreiner, B.; Berg, T.; Norum, K. R. (Sch. Medicine, Univ. Oslo, Blindern, Oslo, Norway). *Acta Pathol. Microbiol. Scand.* [*A*] 85(6):839-849; 1977.

The effect of D-galactosamine on the morphology and secretory activity of isolated rat hepatocytes was studied. Hepatocytes prepared from male Wistar rats were cultured *in vitro*. Cell viability was assayed and protein secretion estimated by measuring radioactivity in a precipitate derived from cultures incubated with [$U^{14}C$]protein hydrolysate. The activity of the secreted lecithin:cholesterol acyltransferase (LCAT) was determined. Total and unesterified cholesterol were estimated by gas liquid chromatography. The glycerol and the triacylglycerol were measured fluorimetrically. The secretion of LCAT from isolated hepatocytes was almost completely blocked when 5 mg/ml of galactosamine was added to the culture. The effect was measurable after 30 min of incubation but it was higher after 3-5 hr. After 3 hr of incubation with galactosamine, there was a slightly lowered secretion of both free cholesterol and triacylglycerol. Galactosamine inhibited the secretion of labeled proteins from the hepatocytes. Viability of the cells was unaffected by the addition of galactosamine. A striking feature of galactosamine-treated hepatocytes was the appearance of dilated lysosomes that were formed by the selective uptake of galactosamine or its metabolites. A large amount of glycogen was observed in cells incubated with both uridine and galactosamine. Galactosamine-treated rat hepatocytes may be a useful model for the study of the interrelationships between LCAT and lipoprotein secretion.

2802 ENANTIOMERS AS PROBES FOR IN VIVO INVESTIGATION OF THE MOLECULAR BASIS OF BIOTRANSFORMATION [Abstract]. (Eng.) Kupfer, A.; Bircher, J. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Digestion* 14(5/6): 463-464; 1976.

2803 PLASMAPERFUSION OF CHARCOAL-COATED GLASS BEADS--AN APPROACH TO HEPATIC EXCRETORY FAILURE [Abstract]. (Eng.) Lauterburg, B. H.; Dickson, E. R.; Pineda, A. A.; Carlson, G.; Taswell, H. F. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1087; 1977.

2804 GROWTH OF NORMAL MURINE LIVER CELLS ON ARTIFICIAL CAPILLARIES [Abstract]. (Eng.) Carman, R.; Hager, J. C.; Thayer, W. R.; Panol, G.; Galletti, P. M. (Rhode Island Hosp., Providence, RI). *Gastroenterology* 72(5, Part 2):1036; 1977.

2805 THE EFFECT OF MAGNESIUMASPARTATE ON PRESERVATION OF THE RAT LIVER. (Eng.) Holscher, B.; Donecker, R.; Gauss, G. (Chirurg. Univ.-Klinik und Poliklinik, Hindenburgdamm 30, D-1000 Berlin 45, W. Germany). *Arzneim. Forsch.* 27(I,1):77-82; 1977.

2806 PERMEABILITY OF RAT LIVER LYSOSOME MEMBRANES. (Eng.) Baccino, F. M.; Zuretti, M. F. (Istituto di Patologia Generale, Corso Raffaello 30, 10125 Torino, Italy). *Panminerva Med.* 18(11/12):472-491; 1976.

2807 GENETIC DETERMINANTS OF HEPATIC DRUG METABOLISM [Abstract]. (Eng.) Cooksley, W. G. E.; Hart, P.; Farrell, G. C.; Powell, L. W. (Dept. Medicine, Univ. Queensland, Brisbane, Australia). *Gastroenterology* 72(5, Part 2):1040; 1977.

2808 AMINOPYRINE BREATH TEST IN DRINKING ALCOHOLICS [Abstract]. (Eng.) Iber, F. L.; Krause, S. (Veterans Admin. Hosp., Baltimore, MD). *Gastroenterology* 72(5, Part 2):1074; 1977.

2809 THE HEPATIC CONTRIBUTION TO SERUM AMYLASE LEVELS [Abstract]. (Eng.) Renner, T. G.; Reitherman, R.; Hoefs, J.; Douglas, A. P. (Univ. Southern California Sch. Medicine, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1119; 1977.

2810 PROALBUMIN AND ALBUMIN SYNTHESIS IN HUMAN LIVER TISSUE [Abstract]. (Eng.) Lundholm, K.; Lindstedt, G.; Lundberg, P. A.; Schersten, T. (Surgical Metabolic Res. Lab. Univ. Goteborg, Goteborg, Sweden). *Digestion* 14(5/6):462-463; 1976.

2811 STUDIES OF THE HEPATIC UPTAKE OF CONJUGATED BILIRUBIN IN THE RAT [Abstract]. (Eng.) Shupeck, M. (Liver Unit, Natl. Inst. Arthritis, Metabolic, Digestive Diseases, Bethesda, MD 20014). *Gastroenterology* 72(5, Part 2):1189; 1977.

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2813 LIVER CELL HETEROGENEITY AND BILE SECRETION IN THE RAT [Abstract]. (Eng.) Gumucio, J. J.; Balabaud, C. P.; Miller, D. L.; Appelman, H. D. (Dept. Internal Medicine, Univ. Michigan, Ann Arbor, MI). *Gastroenterology* 72(5, Part 2):1066; 1977.

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2816 EFFECT OF AGING ON BILIARY LIPID COMPOSITION AND BILE ACID METABOLISM IN NORMAL CHILEAN WOMEN [Abstract]. (Eng.) Valdivieso, V.; Palma, R.; Severin, C.; Antezana, C.; Contreras, A. (Dept. Gastroenterology, Universidad Catolica de Chile, Santiago, Chile). *Gastroenterology* 72 (5, Part 2):1144; 1977.

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N. R.; Van Thiel, D. H. (Dept. Medicine, Univ. Pittsburgh, Pittsburgh, PA). *Gastroenterology* 72(5, Part 2):1088; 1977.

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2824 STEROID-INDUCED BILE ACID SYNTHESIS AND SECRETION IN THE FETAL RAT [Abstract]. (Eng.) Richey, J. E.; Little, J. M.; Van Thiel, D. H.; Lester, R. (Dept. Medicine, Univ. Pittsburgh, Pittsburgh, PA). *Gastroenterology* 72(5, Part 2): 1119; 1977.

2825 REVERSAL BY TRITON WR-1339 OF THE EFFECTS OF ETHINYL ESTRADIOL (EE) ON CHOLESTEROL AND BILE ACID (BA) METABOLISM IN THE RAT [Abstract]. (Eng.) Davis, R. A.; Kern, F., Jr. (Univ. Colorado Medical Sch., Denver, CO). *Gastroenterology* 72(5, Part 2):1045; 1977.

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2832 ETHANOL: A GONADAL TOXIN IN THE FEMALE [Abstract]. (Eng.) Gavaler, J. S.; Van Thiel, D. H.; Lester, R. (Dept. Medicine, Univ. Pittsburgh, Pittsburgh, PA). *Gastroenterology* 72 (5, Part 2):1060; 1977.

2833 RELATIVE UTILIZATION OF FATTY ACIDS FOR SYNTHESIS OF KETONE BODIES AND COMPLEX LIPIDS IN THE LIVER OF DEVELOPING RATS. (Eng.) Yeh, Y. Y.; Streuli, V. L.; Zee, P. (St. Jude Children's Res. Hosp., Memphis, TN 38101). *Lipids* 12(4):367-374; 1977.

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2835 EXPERIMENTAL FATTY LIVER: I. PRODUCTION AND PREVENTION OF FATTY LIVER IN RATS FED CLOFIBRATE AND OROTIC ACID DIETS. II. REVERSAL OF OROTIC ACID-INDUCED FATTY LIVER BY CLOFIBRATE FEEDING [Abstract]. (Eng.) Novikoff, P. M. (New York Univ., New York, NY 10003). *Diss. Abstr. Int.* [*B*] 37(9):4279B; 1977.

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2837 GLUCOCORTICOID REGULATION OF HEPATIC (Na-K) ATPase [Abstract]. (Eng.) Miner, P. B.; Sutherland, E.; Simon, F. R. (Univ. Colorado Medical Center, Denver, CO). *Gastroenterology* 72(5, Part 2):1103; 1977.

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2849 HEPATIC SULFOBROMOPHTHALEIN CLEARANCE IN CHILDREN. (Eng.) Licastro, R.; Fagundes Neto, U.; Rua, E. C. (Prof. Alejandro Posadas Policlinic, Haedo, Buenos Aires Province, Argentina). *Arq. Gastroenterol.* 13(4):273-277; 1976.

2850 SELECTIVE ALTERATION OF BILE ACID (BA) AND BROMOSULPHOPHTHALEIN (BSP) TRANSPORT FOLLOWING HYPOPHYSECTOMY (HX) AND THYROIDECTOMY (TX) [Abstract]. (Eng.) Cersonsky, J. (Univ. Colorado Medical Center, Denver, CO). *Gastroenterology* 72(5, Part 2):1187; 1977.

2851 HEPATIC DISPOSITION OF DIBROMOSULPHTHALEIN IN ISOLATED PERFUSED RAT LIVER. ALBUMIN DEPENDENCE AND INFLUENCE OF PHENOBARBITAL AND NAFENOPIN PRETREATMENT [Abstract]. (Eng.) Meijer, D. K.; Keulemans, K.; Weitering, J. G.; Vonk, R. J. (Dept. Pharmacology, State Univ. Groningen, Groningen, Netherlands). *Digestion* 14(5/6):470-471; 1976.

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2854 AN ANIMAL MODEL OF FULMINANT HEPATIC FAILURE (FHF) [Abstract]. (Eng.) Blitzer, B. L.; Waggoner, J. G.; Jones, E. A.; Gralnick, H.; Towne, D.; Butler, J.; *et al.* (Natl. Inst. Arthritis, Metabolic, Digestive Diseases, Bethesda, MD). *Gastroenterology* 72(5, Part 2):1180; 1977.

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2857 THE EFFECTS OF ALCOHOL AND PARTIAL PORTAL LIGATION ON THE IMMUNE SYSTEM OF THE RAT [Abstract]. (Eng.) Slone, F. L.; Smith, W. I., Jr.; Van Thiel, D. H. (Univ. Pittsburgh, Pittsburgh, PA 15261). *Gastroenterology* 72(5, Part 2):1189; 1977.

2858 CANALICULAR HYPERCHOLERESIS FOLLOWING COMPLETE BILIARY OBSTRUCTION IN THE RAT [Abstract]. (Eng.) Accatino, L.; Contreras, A.; Fernandez, M. S.; Quintana, C. (Dept. Gastroenterology, Universidad Catolica de Chile, Santiago, Chile). *Gastroenterology* 72(5, Part 2):1024; 1977.

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2860 ALTERED PROTEIN SYNTHESIS IN THE LIVER DUE TO NUTRITIONAL INFLUENCES. (Eng.) Sibransky, H. (Univ. South Florida, Coll. Medicine, Tampa, FL 33620). *Panminerva Med.* 18(11/12):422-426; 1976.

2861 MODIFICATION OF LIVER REGENERATION BY AMMONIA AND PLASMA FROM PATIENTS WITH FULMINANT HEPATIC FAILURES (FHF) [Abstract]. (Eng.) Ellis, W. R.; Chur, P. K.; Williams, R.; Murray-Lyon, I. M. (Charing Cross Hosp., London, England). *Digestion* 14(5/6):557; 1976.

2862 ETHANOL SUPPRESSES ^{3}H-THYMIDINE INCORPORATION INTO DNA IN REGENERATING RAT LIVER. DOES IT SUPPRESS HEPATIC REGENERATION [Abstract]? (Eng.) Rayyes, A. N.; Holt, P. R.; Frank, W. O. (St. Luke's Hosp. Center, New York, NY). *Gastroenterology* 72(5, Part 2):1176; 1977.

See also, 2640, 2645, 2648, 2691, 2692, 2763, 2911, 2916, 2936, 2939, 2941, 2942, 2943, 2947, 2962, 2963, 2964, 3048, 3260, 3268, 3305, 3359, 3361, 3383, 3385, 3390, 3391, 3393, 3394, 3395, 3398.

SECRETION AND METABOLISM

Intestine

2863 ROLE OF GASTROINTESTINAL HORMONES IN THE RESPONSE TO MASSIVE RESECTION OF THE SMALL BOWEL. (Eng.) Barros D'Sa, A. A. B.; Buchanan, K. D. (Queen's Univ. Belfast, Inst. Clinical Science, Grosvenor Rd., Belfast BT12 6BJ, Northern Ireland). *Gut* 18(11):877-881; 1977.

The effects of a 75% resection of the distal small bowel on the circulating levels of a range of gastrointestinal hormones were investigated in dogs to define the role of these hormones in the hypersecretion of gastric acid and the accelerated intestinal transit observed after massive enterectomy. Basal and meal-stimulated concentrations of insulin, secretin, gastrin, pancreatic glucagon, and total glucagon-like immunoreactivity (GLI) were measured by radioimmunoassay techniques. After resection, significant depletions of basal and stimulated total GLI ($p<0.05$, $p<0.001$) and a significant rise of stimulated gastrin ($p<0.05$) were discovered. These hormonal alterations may produce an important imbalance of humoral influences on gastrointestinal function. It is suggested that these changes may hold a key to the etiology of the complications of massive resection of the small bowel.

2864 PROXIMAL ENTERECTOMY STIMULATES DISTAL HYPERPLASIA MORE THAN BYPASS OR PANCREATICOBILIARY DIVERSION. (Eng.) Williamson, R. C. N.; Bauer, F. L. R.; Ross, J. S.; Malt, R. A. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 74(1):16-23; 1978.

To help differentiate among the factors responsible for postresectional intestinal hyperplasia, cell proliferation in the distal intestine of male Sprague-Dawley rats was studied after 50% proximal enterectomy or 50% proximal bypass and also after transposition of the duodenal papilla to the mid small bowel. Within 48 hr, all three operations increased RNA and DNA contents in the ileal mucosa 16% to 50% over control values. At 48 hr and 1 week, the response distal to resection exceeded that of bypass or pancreaticobiliary diversion; nucleic acid contents, DNA specific activity, villous height, crypt depth, and luminal circumference were greatest 1 week after resection. By 1 month, however, chemical and histological values after resection were equalled or surpassed by those in the other two groups. In excluded jejunum itself, mucosal atrophy lowered RNA and DNA contents to 60% of control levels 1 month postoperatively. Neither pancreaticobiliary diversion nor proximal enteric bypass produces the same rate of distal hyperplasia as proximal resection. Modest colonic hyperplasia may contribute to intestinal adaptation after proximal enterectomy. Adaptive postresectional cell proliferation appears not to be mediated by intraluminal nutrition or enteric secretions alone; hormonal factors may also be important.

2865 EXPERIMENTAL SHORT GUT: HEPATIC ALTERATIONS AFTER JEJUNOILEAL RESECTION, BYPASS AND VIBRAMYCIN THERAPY. (Eng.) Burney, D. P.; Burnham, S. J.; Hough, A. J.; Scott, H. W. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37232). *Am. Surg.* 43(12):778-786; 1977.

The hypothesis that *Bacteroides* endotoxin absorbed from the bypassed segment in the end-to-side jejunoileal bypass is the causative factor in postintestinal bypass hepatic failure was tested in 18 dogs with and without concomitant administration of an oral broad spectrum antibiotic (Vibramycin, 100 mg/day). The study was done in two phases on two groups of dogs. In phase 1, six dogs underwent a greater than 80% jejunoileal resection and end-to-end anastomosis of 24 inches of proximal jejunum to 12 inches of distal ileum. Twelve dogs had no resection but the same degree of bypass. The ileal end of the bypassed segment was anastomosed to the side of the mid-transverse colon; the proximal end of the bypassed small bowel was closed and sutured to the mesentery. Six of the latter 12 dogs received the antibiotic. All dogs had progressive weight loss followed by stabilization and normal liver function test, hemograms, and liver biopsies during the 6-month observation period. In the 12 bypass-operated dogs, bacterial cultures for aerobes and anaerobes showed identical flora, irrespective of antibiotic therapy. The bowel was then shortened further in all dogs (phase 2) to leave only 16 inches of small gut (10 inches of duodenum and proximal jejunum plus 6 inches of distal ileum) from pylorus to cecum. Antibiotic therapy was continued as before for six dogs. Dogs subjected to resection in phase 1 showed essentially normal chemical tests (serum hemoglobin, WBC counts, total protein concentration, serum albumin level, LDH, SGOT, alkaline phosphatase levels, and bilirubin) and liver biopsy results following phase-2 operation; there was one anesthetic death at the second operation and one death from malnutrition 6 months after the reshortening. Chemical and histologic (e.g., hepatic steatosis and cellular necrosis) evidence of hepatic failure developed in all 12 bypass-operated dogs, both with and without antibiotic therapy. Multiple aerobic and anaerobic bacteria were demonstrated in all dogs. Three resected dogs and three bypass-operated dogs each yielded one *Bacteroides* species. No bacterial overgrowth occurred. The results suggest that hepatic disease occurs consistently with severely shortened gut plus jejunoileal bypass, but not with severely shortened gut and jejunoileal resection. These data do not support the theory that hepatic failure results from overgrowth of a specific bacterial strain since antibiotic treatment did not prevent hepatic cellular necrosis or qualitatively alter the bacterial flora cultured from the bypassed segment.

2866 INTESTINAL CALCIUM-BINDING PROTEIN 3 MONTHS AFTER MASSIVE SMALL BOWEL RESECTION IN THE PIGLET. (Eng.) Margolis, A.; Ricour, C.; Harouchi, A.; Guyot, M.; Laouari, D.; Balsan, S. (Hopital des Enfants Malades, 75730 Paris, Cedex 15, France). *Am. J. Clin. Nutr.* 30(2):2041-2046; 1977.

The adaptive changes in intestinal calcium-binding protein and calcium binding activity were studied at resection and 3 months after 90% small bowel resection in piglets and one adult pig. A calcium-binding protein (molecular weight$\approx$11,000) with calcium-dependent electrophoretic mobility was partially purified from mucosal extract of proximal jejunum, mid-gut, and ileum. The concentration of calcium-binding protein and the calcium-binding activity of the intact animals were highest in the proximal jejunal segment and lowest in the ileal segment. After resection in the four surviving animals out of nine, a significant increase in calcium-binding activity was observed in the proximal jejunum and in the distal ileal segment. The change in calcium-binding activity was much more marked in the ileum than the jejunum. These data demonstrate that pig intestinal mucosa possesses an adaptive capacity to increase the synthesis of calcium-binding protein after massive small bowel resection.

2867 MECHANISM OF PRODUCTION OF INTESTINAL SECRETION BY NEGATIVE LUMINAL PRESSURE. (Eng.) Hakim, A. A.; Papeleux, C. B.; Lane, J. B.; Lifson, N.; Yablonski, M. E. (Univ. Minnesota Medical Sch., Minneapolis, MN 55455). *Am. J. Physiol.* 233(5):E416-E421; 1977.

The relationships between luminal hydrostatic pressure and fluid transport by dog jejunum *in vivo* were compared with quantitative predictions from a model proposed for the mechanism of the secretion produced by elevated venous pressure. Hydrostatic pressure and fluid transport were studied in sheets of jejunum inserted in a Wells clamp. According to the model, the secretion produced by increasing venous pressure and the secretion produced by negative luminal pressure are both passive filtrates contingent on a transepithelial pressure of a few centimeters of H_2O. The agreement between the observed and predicted responses to luminal pressure provided strong support for the model. In particular (a) the observations displayed a predicted gross asymmetry in rates of fluid transfer with isotonic fluids, depending on whether the luminal pressure was positive or negative; (b) the observed magnitude of the negative luminal pressure required for the onset of secretion agreed with predictions; and (c) the secretion contained significant amounts of protein at about 25% of the plasma concentration.

2868 LAMINA PROPRIA MACROPHAGES OF INTESTINE OF THE GUINEA PIG: POSSIBLE ROLE IN PHAGOCYTOSIS OF MIGRATING CELLS. (Eng.) Sawicki, W.; Kucharczyk, K.; Szymanska, K.; Kujawa, M. (Sch. Medicine, Chalubinskiego 5, 02-004 Warsaw, Poland). *Gastroenterology* 73(6):1340-1344; 1977.

To test the hypothesis that lamina propria macrophages may play a role in phagocytosis of nuclear material originating from migrating cells of the intestinal mucosa, these macrophages were studied in the guinea pig, mouse, and rat small and large intestines, and in human duodenum. The macrophages of lamina propria were commonly found both in the small and the large intestine of all these species. The frequency of macrophage occurrence was highest in the lamina propria of villus apices of the small intestine and beneath the lining epithelium of the large intestine. In the cytoplasm of lamina propria macrophages localized in those regions, Feulgen-positive (DNA-containing) granules were observed, particularly in the guinea pig intestine. Autoradiography of the latter, 3 to 5 days after $[^3H]$thymidine injection, showed the coincidence of occurrence of labeled Feulgen-positive granules in the macrophage cytoplasm with the appearance of labeled epithelial cells and sheath-fibroblasts in the region of lamina propria containing the highest accumulation of macrophages, i.e., at the apices of villi of the small intestine and beneath the lining epithelium of the large intestine. Labeled nuclei of macrophages were observed much less frequently than were labeled cytoplasmic granules. No labeled Feulgen-positive granules were seen in macrophages 0.5 hr, 1, 2, or 7 days after [^{3}H]thymidine injection. The lamina propria macrophages may play a role in the phagocytosis of some migrating cells of the intestinal mucosa, most probably of the sheath fibroblasts and/or intra-epithelial lymphocytes.

2869 EFFECTS OF TETRACYCLINE HYDROCHLORIDE ON ALBINO RAT INTESTINAL MUCOSA. (Eng.) Sehgal, A. K.; Chhuttani, P. N.; Habibullah, C. M. (Postgraduate Inst. Medical Education and Res., Chandigarh, India). *J. Indian Med. Assoc.* 68(4): 69-71; 1977.

The effect of tetracycline on rat intestinal mucosa was investigated. Two groups of animals received tetracycline (6 mg/100 g/day) p.o. for 15 days or 2 months, resp., while a control group received placebo. There was an increase in the height of the villi and an increase in the depth of the crypts in the duodenal and jejunal mucosa in both the short-term and long-term drug groups. This effect was reversible. There were few differences in the changes observed in the short-term and long-term groups. There was no change in the epithelial cell height. The cell count in the corium decreased in three regions in the treated animals.

2870 SALVAGE OF ADENOSINE, INOSINE, HYPOXANTHINE, AND ADENINE BY THE ISOLATED EPITHELIUM OF GUINEA PIG JEJUNUM. (Eng.) Kolassa, N.; Stengg, R.; Turnheim, K. (Pharmakologisches Institut, Universitat Wien, Wahringerstr., 13a, A-1090 Vienna, Austria). *Can. J. Physiol. Pharmacol.* 55 (5):1039-1044; 1977.

The metabolism of ^{14}C-labeled adenosine, inosine, hypoxanthine, and adenine (all at 5×10^{-6} M) was studied in isolated epithelium of guinea pig jejunum. When adenosine or adenine was added to the antiluminal side of the epithelium, two-thirds or one-half, resp., of cellular radioactivity was incorporated into the nucleotide fraction, mainly in the form of adenine nucleotides. Nucleotide synthesis from inosine or hypoxanthine was significantly smaller than that from adenosine. By contrast, another metabolic pattern was found after luminal administration of adenosine, inosine, or hypoxanthine; the incorporation rate into the nucleotide fraction was equally high, and the label was recovered in inosine monophosphate (IMP) and adenine nucleotides to about the same extent with all three substrates. Purine riboside (10^{-4} M) significantly depressed nucleotide formation from adenosine, with respect to IMP formation in particular, while no change was observed in inosine or hypoxanthine salvage. The results suggest compartmentation of the enzymes of purine metabolism within the intestinal mucosa.

2871 PROPRANOLOL INHIBITS BILE ACID AND FATTY ACID STIMULATION OF CYCLIC AMP IN HUMAN COLON. (Eng.) Coyne, M. J.; Bonorris, G. G.; Chung, A.; Conley, D.; Schoenfield, L. J. (Cedars-Sinai Medical Center, 8700 Beverly Blvd., Los Angeles, CA 90048). *Gastroenterology* 73(5):971-974; 1977.

The effect of bile acids, fatty acids, catecholamines, and propranolol on cyclic AMP (cAMP) was studied in human colonic mucosa to study the role of cAMP in bile acid- and fatty acid-induced diarrhea. In normal colonic mucosa obtained at surgery, the effects on cAMP synthesis of 10^{-5} M deoxycholic acid, 10^{-5} M cholic acid, 10^{-5} M 9,10-hydroxystearic acid, 10^{-5} M oleic acid, 10^{-4} M epinephrine, and 10^{-4} M norepinephrine were studied in six experiments. In tissue incubated with 10^{-5} M deoxycholic acid or 9,10-hydroxystearic acid, the effect on cAMP of 10^{-6} M propranolol, with and without 10^{-4} M epinephrine, or 10^{-4} M norepinephrine was studied in six more experiments. Deoxycholic acid increased adenylate cyclase (AC) activity 203% ($p<0.01$), and 9,10-hydroxystearic acid increased AC 236% ($p<0.01$). No other agents stimulated AC. Propranolol decreased basal AC 43% ($p<0.01$), deoxycholic acid stimulated AC 46% ($p<0.01$), and hydrostearic acid stimulated AC 37% ($p<0.01$). Epinephrine or norepinephrine did not reverse these decreases. None of the agents affected phosphodiesterase. Deoxycholic acid and 9,10-hydroxystearic acid stimulate AC in human colonic mucosa, suggesting that bile acid- and fatty acid-induced diarrhea are mediated by the cAMP system. Because propranolol prevents this AC stimulation, propranolol should be investigated as a possible treatment for these diarrheal conditions.

2872 LACK OF CIRCADIAN RHYTHMICITY OF RAT FETAL INTESTINAL ENZYMES AS COMPARED TO THE DAMS. (Eng.) Stevenson, N. R.; Byra, W. M.; Day, S. E. (Rutgers Medical Sch., Piscataway, NJ 08854). *Dev. Biol.* 60(2):487-492; 1977.

To study endogenous rhythms of intestinal enzymes and the need for p.o. and/or intermittent intake for the maintenance of these rhythms, the 24-hr activity patterns of intestinal maltase, lactase, leucylnaphthylamine hydrolyzing activity, γ-glutamyltransferase, and alkaline phosphatase were determined in pregnant rats maintained on a 12-12 light-dark cycle, with feeding during the dark period (1800-0600 hr). The activities of these enzymes plus those of lysosomal maltase and lactase were followed during the same time period in 19- to 20-day-old fetuses. The activity patterns in the dams followed circadian rhythms, with peak activities occurring during the feeding-dark period. These rhythms were similar to the feeding schedule-cued rhythms observed in male rats and, therefore, are assumed to be feeding schedule cued also. In the fetuses, the activities increased in a nonlinear manner throughout the entire 24-hr period, but did not display a defined rhythm. It is concluded that endogenous intestinal enzyme rhythms do not exist *in utero*, and that p.o. and/or intermittent feeding is necessary for these rhythms to occur.

2873 STIMULATION OF ADENYLATE CYCLASE IN HOMOGENATES OF ISOLATED INTESTINAL EPITHELIAL CELLS FROM HAMSTERS: EFFECTS OF GASTROINTESTINAL HORMONES, PROSTAGLANDINS, AND DEOXYCHOLIC AND RICINOLEIC ACIDS. (Eng.) Gaginella, T. S.; Phillips, S. F.; Dozois, R. R.; Go, V. L. W. (Coll. Pharmacy, Ohio State Univ., Columbus, OH 43210). *Gastroenterology* 74(1):11-15; 1978.

The ability of gastrointestinal hormones to stimulate intestinal adenylate cyclase was studied in isolated small intestinal villus cells of the hamster, because the mechanism by which intestinal secretagogues evoke fluid secretion in the small bowel and colon has been suggested to involve mucosal adenylate cyclase. Adenylate cyclase activity was assayed by conversion of $[^{32}P]$ATP to $[^{32}P]$cyclic AMP in a system of pure epithelial cells isolated by vibration in buffer. Vasoactive intestinal peptide and impure cholecystokinin-pancreozymin (but not the 99% pure preparation or pure cholecystokinin octapeptide) were potent stimuli of adenylate cyclase, but pentagastrin, glucagon, secretin, and gastric inhibitory peptide were impotent. Prostaglandins E_1 and E_2 were potent stimuli of adenylate cyclase. Deoxycholic acid and ricinoleic acid were ineffective stimuli of adenylate cyclase. These experiments do not support a clear-cut relation between a compound's ability to stimulate adenylate cyclase and its activity as an intestinal secretagogue.

2874 STIMULATION OF INTESTINAL Ca^{2+}-ATPase ACTIVITY BY CYSTEINE. (Eng.) Matsuda, T.; Maeda, S.; Baba, A.; Iwata, H. (Dept. Pharmacology, Osaka Univ., 133-1, Yamada-kami, Suita-shi, Osaka, Japan). *Life Sci.* 21(7):915-920; 1977.

Small intestinal calcium transport was studied *in vitro* in male Sprague-Dawley rats. Cysteine (0.1 mM) stimulated the activity of the ATPase dependent on Ca^{2+}, but not those dependent on Mg^{2+} and Zn^{2+}, in the microsomal and brush border fractions of the duodenal mucosa. This Ca^{2+}-dependent ATPase was localized in the duodenum but was not present in the jejunum or ileum. Kinetic studies showed that cysteine did not change the K_m value for ATP but decreased that for Ca^{2+}. Glutathione, 2-mercaptoethanol, and dithiothreitol also stimulated the Ca^{2+}-ATPase activity. These findings suggest that thiol-containing reagents stimulate the Ca^{2+}-ATPase activity in the duodenum by affecting the interaction of the enzyme with Ca^{2+}.

2875 GLYCEROL-ESTER HYDROLASE FROM HUMAN SMALL INTESTINE AND ITS POSSIBLE ROLE IN THE DEGRADATION OF NEUTRAL LIPIDS. (Eng.) Negrel, R.; Serrero, G.; Ailhaud, G.; Rey, J. F.; Delmont, J. (Hopital de Cimiez, Nice, France). *Digestion* 16(1/2):146-159; 1977.

A glycerol-ester hydrolase (GEH, molecular weight of 70,000) was isolated from homogenized, scraped, human jejunal mucosa and identified by polyacrylamide-gel electrophoresis and specific staining, and partially characterized. The enzyme activity was essentially the same along the whole length of the intestinal wall as measured by hydrolytic activity against three substrates (tributyrin, *p*-nitrophenylacetate, and palmityl CoA), using tissues from intestinal biopsies or intestinal fragments. No cross-reaction was observed between GEH and immunoserum against human pancreatic juice, indicating the low contamination by pancreatic enzymes and supporting the intestinal origin of GEH. The optimum pH for GEH activity was 8.0 to 8.5, which excluded the possibility of contamination by acidic lipases of gastric or pharyngeal origin. The presence of neutral detergent increases the stability of activity against tributyrin and *p*-nitrophenylacetate; the coaxial peaks of activity against these substrates suggest that there is a single enzyme involved, the ratio being 3-4.2 along the peak. The thiolester hydrolase activity (against palmityl Co-A) was separated from that of GEH. The ratio of activity against tributyrin versus 1(3)-mono-olein remained constant along the purification, suggesting that hydrolytic activity against long-chain monoglycerides in human intestinal homogenates is caused by the glycerol-ester hydrolase. The enzyme was not completely inhibited by a mixture of bile salts mimicking human bile, so that it should remain at least partially active in the lumen where bile salts are present. There seems to be no significant variation in GEH activity in the jejuna of patients with pancreatic lipase deficiencies due to limited supplies of pancreatic juice; hence, GEH does not seem to respond to environmental factors. Substrates may be soluble (*p*-nitrophenylacetate), micellar (mono-olein), or emulsified (dioctanoin and trihexanoin) in form. Enzyme activity occurs preferentially on short-chain triglycerides and medium-chain diglycerides. Since patients presenting with lipid malabsorption disorders absorb medium-chain triglycerides efficiently, it is likely that there is partial hydrolysis by pharyngeal and pancreatic lipases. The partial glycerides can then be hydrolyzed by the glycerol-ester hydrolase in the lumen or intracellularly. Hence, GEH is postulated to play a role in the absorption of neutral lipids, particularly in pathological situations.

2876 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE IN ISOLATED VILLOUS AND CRYPT CELLS OF THE RAT ILEUM. (Eng.) Merchant, J. L.; Heller, R. A. (Sch. Medicine, Stanford Univ., Stanford, CA 94305). *J. Lipid Res.* 18(6):722-733; 1977.

The localization of 3-hydroxy-3-methylglutaryl coenzyme A reductase (HMG-CoA reductase) in the rat small intestinal villus and crypt cells was accomplished after separating these cells from the mucosal layer by sequential dissociation in a "dual-buffer" system. Consistent separation was demonstrated by using the marker enzymes alkaline phosphatase (specific to the villus cell) and thymidine kinase (specific to the crypt cell). Cells obtained were 95-100% viable, and no relative difference in lability was observed, as evidenced by the equal distribution of acid phosphatase. This method of cell separation was an improvement over the "scraping" technique that damaged cells severely and produced villus preparations that contained little or no reductase activity. The HMG-CoA reductase specific activity in whole cell homogenates of the ileal villi was 0.47 and of the crypts was 0.27 nmol/min/mg of protein, considerably higher values than have been reported earlier. Also, in comparison to the crypts, the villi incorporated 1.5-fold more [^{14}C]-acetate into sterols, a ratio similar to that describing the distribution of HMG-CoA reductase in the two cell populations. These results unequivocally establish that the villi have higher HMG-CoA reductase activity than do the crypts and confirm an earlier report from this laboratory that the villi are a major site of sterol synthesis. The sterol biosynthetic capacity of the small intestine was highest in the ileum and decreased towards the jejunum. The HMG-CoA reductase specific activity of the ileum averaged 0.30 and that of the jejunum 0.10 nmol/min/mg of protein; however, the cholesterol content of the ileum was slightly lower than the jejunum. These results suggest the possibility that the sterol content of the ileum may largely be due to *in situ* synthesis.

2877 DEVELOPMENT OF INTESTINAL BRUSH BORDER MEMBRANE PROTEINS IN THE RAT. (Eng.)

Seetharam, B.; Yeh, K. Y.; Moog, F.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Biochim. Biophys. Acta* 470(3):424-436; 1977.

The proteins of the intestinal microvillus membrane were studied during postnatal development in the rat (days 12-37). In suckling animals ($\leq$20 days), the majority of alkaline phosphatase, glucoamylase, and lactase activities in the distal half of the intestine were located in the supernatant fraction (100,000 x *g*, 60 min). These enzymes were attached to the membrane from the proximal intestine at all ages. Alkaline phosphatase, maltase, and lactase activities in the supernatant fractions chromatographed in Sephadex G-200 in positions similar to the corresponding membrane enzyme. Corresponding activities for lysosomal counterparts of maltase and lactase present in the supernatant fraction chromatographed differently. The pH optimum of the soluble enzymes was 9.2 for phosphatase and 5.5-6.0 for glycoamylase and lactase. The soluble lactase and alkaline phosphatase were inhibited minimally by *p*-chloromercuribenzoate and sodium fluoride, resp. L-phenylalanine (20 mM) inhibited the soluble phosphatase by 90%. Thus, the soluble enzymes are not mainly of lysosomal origin, but have characteristics of membrane-bound enzymes. Polyacrylamide gel electrophoresis in sodium dodecyl sulfate revealed 18 protein bands that were present in adult membranes. Two other proteins were unique for membranes of distal intestine in suckling rats. The proteins corresponding to known enzyme activity changed as expected with age (e.g., sucrase and maltase activities increased, lactase activity decreased). Most of the other proteins were also altered quantitatively during development. Thus, the changes in the microvillus membrane during development in the rat are not limited to specific enzymes.

2878 INTESTINAL 1,25-DIHYDROXYVITAMIN D$_3$ BINDING PROTEIN: SPECIFICITY OF BINDING. (Eng.)

Eisman, J. A.; DeLuca, H. F. (Coll. Agricultural and Life Sciences, Univ. Wisconsin-Madison, Madison, WI 53706). *Steroids* 30(2):245-257; 1977.

The binding of metabolites of vitamin D and their analogs to the 3.7S chick intestinal cytosol receptor protein was specifically studied by competitive binding techniques and polyethylene glycol precipitation of the complex. The structural requirements for the interaction between the vitamin D molecule and the receptor were assessed without the nuclear chromatin binding step. 1,25-Dihydroxyvitamin D$_3$ and 1,25-dihydroxyvitamin D$_2$ were found to be equally competitive and were the most active. Of the structural features of the compounds, the 1α-hydroxyl was found to be the most important followed by the 25-hydroxyl and the 3β-hydroxyl. The addition of a second hydroxyl near carbon 25 markedly reduced binding, whether on the 26 carbon or the 24 carbon. A hydroxyl on C-24 could substitute to some degree for the 25-hydroxyl, inasmuch as 24-hydroxyvitamin D$_3$ was much more effective than vitamin D$_3$ but less effective than 25-hydroxyvitamin D$_3$. In general, the patterns of binding affinities correlated well with the biological activity of the various analogs, which strongly supports a physiological role for the 1,25-dihydroxyvitamin D$_3$ binding protein. The results also suggest that, in the two-step receptor mechanism, the structural specificity is located in the initial interaction of the 1,25-dihydroxyvitamin D$_3$ and the cytosol receptor.

2879 CHANGES IN BLOOD SEROTONIN IN EXPERIMENTAL INTESTINAL OBSTRUCTION IN DOGS. (Eng.)

Ojha, S. C.; Sarkar, F. H.; Khanna, N. N.; Udupa, K. N. (Inst. Medical Sciences, Banaras Hindu Univ., Varanasi 221 005, India). *Indian J. Exp. Biol.* 15(10):931-932; 1977.

Changes in blood serotonin level were examined in dogs with experimental, acute simple, or strangulation obstructions of the proximal jejunum. A statistically significant increase ($p<0.01$) in the serotonin concentration was observed on the third day after acute simple obstruction was produced. In strangulation obstructions, a significant rise was seen 6 and 12 hr after operation ($p<0.01$ and $p<0.025$, resp.) in untreated animals, whereas no significant rise was seen in antibiotic-treated animals. Changes in blood serotonin levels appear to be important in toxemia complicating intestinal obstruction.

2880 FIBRE AND ENTEROHEPATIC CIRCULATION.

(Eng.) Eastwood, M. A. (Western General

Hosp., Edinburgh, Scotland). *Nutr. Rev.* 35(3):42-44; 1977.

2881 THE INTERDIGESTIVE MYOELECTRIC COMPLEX IN MAN: EFFECT OF FOOD AND OF HIGH SERUM GASTRIN LEVELS [Abstract]. (Eng.) Janssens, J.; Vantrappen, G.; Hellemans, J. (Dept. Medical Res., Univ. Leuven, Leuven, Belgium). *Gastroenterology* 72(5, Part 2):1161; 1977.

2882 DEMONSTRATION OF NEUROTENSIN-IMMUNOREACTIVE CELLS IN THE GEP-SYSTEM OF MAN AND VARIOUS MAMMALS [Abstract]. (Eng.) Helmstaedter, V.; Feurle, G. E.; Taugner, C.; Forssmann, W. G. (Anatomisches Institut III, Universitat, Heidelberg, W. Germany). *Acta Endocrinol. (Kbh.)* 85(Suppl. 212):104; 1977.

2883 STIMULATION BY IMMUNE COMPLEXES OF MUCUS RELEASE FROM THE GOBLET CELLS OF THE RAT SMALL INTESTINE [Abstract]. (Eng.) Bloch, K. J.; Walker, W. A. (Massachusetts General Hosp., Boston, MA 02114). *Fed. Proc.* 36(3):1054; 1977.

2884 POSSIBLE PRECURSOR RELATIONSHIP BETWEEN GUT GLUCAGON-LIKE IMMUNOREACTIVITY (GLI) AND GLUCAGON [Abstract]. (Eng.) Conlon, J. M.; Murphy, R. F.; Buchanan, K. D. (Dept. Biochemistry, Queen's Univ., Belfast, Northern Ireland). *Gut* 18(5):A410; 1977.

2885 USE OF SYNTHETIC FRAGMENTS FOR SPECIFIC IMMUNOSTAINING OF CCK CELLS [Abstract]. (Eng.) Buchan, A. M. J.; Polak, J. M.; Facer, P.; Bloom, S. R.; Szelke, M.; Hudson, D.; Pearse, A. G. E. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(5):A406; 1977.

2886 IS ETHANOL (Eth) TOXICITY IN THE JEJUNUM DUE TO OSMOTIC DAMAGE [Abstract]? (Eng.) Fox, J. E.; Dinda, P. K.; Beck, I. T. (Queen's Univ. Digestive Diseases Unit, Kingston, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1058; 1977.

2887 INHIBITION OF TESTMEAL AND OIL-INDUCED PANCREOZYMIN RELEASE BY SOMATOSTATIN IN MAN [Abstract]. (Eng.) Schlegel, W.; Raptis, S.; Harvey, R. F.; Oliver, J. M.; Pfeiffer, E. F. (Dept. Internal Medicine, Univ. Ulm, Ulm, W. Germany). *Acta Endocrinol. (Kbh.)* 85(Suppl. 212):106A; 1977.

2888 INHIBITION BY SOMATOSTATIN OF VIP-STIMULATED INTESTINAL SECRETION [Abstract]. (Eng.) Carter, R. F.; Zfass, A. M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA). *Clin. Res.* 25(3):309A; 1977.

2889 LIPIDS OF THE ANAL SAC SECRETIONS OF THE RED FOX, Vulpes vulpus, AND OF THE LION Panthera leo. (Eng.) Albone, E. S.; Gronneberg, T. O. (Dept. Animal Husbandry, Univ. Bristol, Langford, Bristol BS18 7DU, England). *J. Lipid Res.* 18(4):474-479; 1977.

2890 TWO MICROSOMAL-ASSOCIATED IRON-BINDING PROTEINS OBSERVED IN RAT SMALL INTESTINAL CELLS DURING IRON ABSORPTION. (Eng.) Kaufman, N.; Wyllie, J. C.; Newkirk, M. (Kingston General Hosp., Kingston, Ontario, Canada). *Biochim. Biophys. Acta* 497(3):719-727; 1977.

2891 EFFECT OF DIETARY PROTEIN WITH AND WITHOUT ADDED DIETARY FIBRE ON FAECAL AMMONIA CONCENTRATIONS AND ON COLONIC FUNCTION [Abstract]. (Eng.) Cummings, J. H.; Branch, W. J.; Houston, H.; Jenkins, D. J. A. (Medical Res. Council, Dunn Nutrition Lab., Cambridge, England). *Gut* 18(5): 411-412; 1977.

2892 GLYCOPROTEIN SECRETION AND METABOLISM IN RABBIT ILEUM AFTER EXPOSURE TO CHOLERA AND SHIGELLA ENTEROTOXINS [Abstract]. (Eng.) Kristensen, M.; Kim, Y. S. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2): 1084; 1977.

See also, 2630, 2633, 2634, 2636, 2639, 2659, 2671, 2710, 2720, 2748, 2765, 2767, 2893, 2894, 2895, 2900, 2901, 2906, 2907, 2908, 2918, 2925, 2927, 3104, 3114, 3137, 3178, 3205, 3218, 3219, 3224, 3350, 3421.

GENERAL

2893 THE INFLUENCE OF GASTRIC SURGERY ON THE INTESTINAL FLORA. (Eng.) Greenlee, H. B.; Gelbart, S. M.; DeOrio, A. J.; Francescatti, D. S.; Paez, J.; Reinhardt, G. F. (Veterans Admin. Hosp., Hines, IL). *Am. J. Clin. Nutr.* 30(11):1826-1833; 1977.

Varying degrees of vagal denervation and gastric resection were performed in dogs analogous to five different peptic ulcer operations commonly performed in patients, to study changes in bacterial flora. Postoperative cultures of the stomach and small bowel were obtained via laparotomy at intervals up to 1 yr. Quantitative aerobic and anaerobic bacteriological studies demonstrated a persistent and marked increase in the number of microorganisms comprising the flora of the upper small bowel after each of these gastric operations except parietal cell (proximal gastric) vagotomy. In parietal cell vagotomy, antral-duodenal parasympathetic innervation is preserved, and generally no modification of the gastric outlet is necessary unless stenosis is present. The reduction in gastric acidity following parietal cell vagotomy that was observed at the 30- and 90-day postoperative test intervals paralleled the reduction seen after more extensive gastric surgical operations. Attempts to explain the mechanism(s) of bacterial proliferation in the upper small bowel following peptic ulcer surgery must therefore take into account the influence of antral-duodenal vagal innervation as well as the bacteriostatic effects of gastric acid.

2894 THE EFFECT OF "HUMANISED" MILKS AND SUPPLEMENTED BREAST FEEDING ON THE FAECAL FLORA OF INFANTS. (Eng.) Bullen, C. L.; Tearle, P. V.; Stewart, M. G. (Public Health Lab., Luton, England). *J. Med. Microbiol.* 10(4):403-443; 1977.

The microbiological and physicochemical properties of fecal specimens from 47 babies on different diets were studied weekly during the first 6 weeks of life. Thirteen infants received breast milk alone, 9 received Cow and Gate Premium milk, 10 received Scientific Milk Adaptation Gold Cap milk, and 15 received breast milk and in the first week of life a supplement of modified cows' milk. The Cow and Gate Premium milk and the Scientific Milk Adaptation Gold Cap milk formulas were cow's milk preparations with the protein and carbohydrate content adjusted to concentrations similar to those of breast milk and with buffering capacities only slightly greater than that of breast milk. An acetate buffer was demonstrated in the feces of over 60% of breast-fed infants during the first 4 weeks of life. No buffer was demonstrated in the feces of either bottle-fed group over the same period. Only 20% of breast-fed infants receiving a supplement produced an acetate buffer in the first week, but this figure increased to 60% by the fourth week. Breast-fed babies produced feces with a low pH (5.1-5.4), high counts of bifidobacteria, and low counts of coliforms, bacteroids, and clostridia; with the exception of acetic acid, there was a notable absence of most volatile fatty acids from these feces. Infants fed Premium milk produced feces with a high pH (5.9-8.0) and a relatively high bifidobacterial count in the first week; thereafter no bacterial species predominated. A wide variety of volatile fatty acids was present in these infants' feces. Infants fed Gold Cap milk produced feces with a high pH (6.4-8.2) and a wide variety of volatile fatty acids; the counts of coliform bacilli and putrefactive bacteria were high, while bifidobacteria counts were low. Breast-fed infants who received a supplement in the first week produced acid feces, but the pH was higher than that of infants fed breast milk alone; the bacterial flora was putrefactive for the first 2 weeks but gradually became fermentative, and although several volatile fatty acids were detected in the feces in the first week they gradually decreased during the following 5 weeks. The results support earlier findings that the supplementation of breast feeding with artificial feeds of high buffering capacities interferes with the establishment of a fermentative bacterial flora and consequently with the development of acidic feces.

2895 COMPARISON OF THE FECAL MICROFLORA OF SEVENTH-DAY ADVENTISTS WITH INDIVIDUALS CONSUMING A GENERAL DIET: IMPLICATIONS CONCERNING COLONIC CARCINOMA. (Eng.) Goldberg, M. J.; Smith, J. W.; Nichols, R. L. (Univ. Illinois Hosp., Chicago, IL). *Ann. Surg.* 186(1):97-100; 1977.

A double-blind study was carried out in 14 Seventh-Day Adventists, who were vegetarians, and in 14 subjects on a general western diet to determine if there are quantitative or qualitative differences in the fecal microflora of vegetarians. No statistically significant differences were identified in the fecal microflora of the two groups. The bacteriologic analysis included total aerobes and total anaerobes as well as each of the major fecal aerobes and anaerobes. This study seems to indicate that the dietary intake of animal fat and protein does not significantly alter the fecal microflora. It does not, however, invalidate the concept that dietary animal fat does increase bile acid degradation within the gastrointestinal tract, a factor that has been related to colon cancer. Future studies should be directed at identifying the factors that may be present in the gastrointestinal tracts of vegetarians that modify the ability of their colonic microflora to degrade bile acids, an essential step in the production of intraluminal carcinogens or cocarcinogens.

2896 STUDIES ON THE PATHOGENICITY OF Yersinia enterocolitica. I. EXPERIMENTAL INFECTION IN RABBITS. (Eng.) Une, T. (Res. Inst., Daiichi Seiyaku Co., Ltd., 2810, Minamifunabori, Edogawa-ku, Tokyo 132, Japan). *Microbiol. Immunol.* 21(7):349-363; 1977.

The pathogenicity of *Yersinia enterocolitica* was analyzed in a model in which rabbits were inoculated intraduodenally with strains isolated from various sources. Pathogenic strains easily penetrated the epithelial linings of the intestinal mucous membrane into the target reticuloendothelial tissues of the intestine, such as the lamina propria and lymph follicles, where they multiplied within mononuclear cells and produced granuloma. Granuloma, in severe infections, underwent necrobiosis and sometimes progressed to ulceration accompanied by colony formation of the organisms. In mild infections, granulomatous lesions were localized in lymph follicles and never progressed to ulceration. Nonpathogenic strains were rapidly excreted without penetration of epithelial linings. These observations suggest that *Y. enterocolitica* should be within the category of invasion-type enteropathogenic bacteria such as *Shigella* and *Salmonella*.

2897 MICROVASCULAR PRESSURES IN RAT INTESTINAL MUSCLE AND MUCOSAL VILLI. (Eng.) Gore, R. W.; Bohlen, H. G. (Coll. Medicine, Univ. Arizona, Tucson, AZ 85724). *Am. J. Physiol.* 233(6): H685-H693; 1977.

Direct pressures were recorded from single innervated microvessels in intestinal muscle, submucosal surface, and mucosal villi of rats to obtain a more complete, quantitative measure of the normal pressure distributions in these regions. Results were compared with existing data from whole-organ, isogravimetric studies. Pressures were recorded with a servo-null transducer; vessel dimensions, with a video device; and relative blood flows in muscle and mucosal regions, with microparticles. When femoral artery pressure was 100-110 mm Hg, the average pressures in first-, second-, third-, and fifth-order muscle and submucosal arterioles were 44.8 ± 1.6, 44.6 ± 2.9, 32.4 ± 2.6, and 26.6 ± 2.0 mm Hg, resp. Pressures in fourth-, second-, and first-order muscle and submucosal venules were 16.2 ± 0.8, 14.6 ± 0.9, and 10.5 ± 0.6 mm Hg, resp.; muscle capillary pressures averaged 23.8 ± 1.5 mm Hg. Average pressures in distributing arterioles, capillaries, and second-order venules in mucosal villi were 30.6 ± 1.8, 13.8 ± 2.2, and 12.8 ± 1.5 mm Hg, resp. Relative mean blood flows were 30 ± 1% in the muscles and 70 ± 1% in mucosal villi. The results show that significant regional differences in capillary pressures exist between intestinal muscle and mucosal layers. Capillary pressures and relative flows were used to calculate a weighted-average capillary pressure of 16.8 mm Hg for the whole intestine, which compares favorably with results from isogravimetric studies, and implies that regions in the intestine may continuously filter or absorb while the whole organ is in fluid balance. These results resolve an apparent discrepancy between previous isogravimetric and microcirculatory experiments, but raise new questions about regional differences in transcapillary fluid exchange. Also, resistance ratios calculated from the data indicate venular resistances in the intestine are more important than previously thought.

2898 ACUTE DISTAL INTESTINAL OBSTRUCTION IN GNOTOBIOTIC RATS: INTESTINAL MORPHOLOGY AND CELL RENEWAL. (Eng.) Ecknauer, R.; Clarke, R. M.; Meyer, H. (Univ. Texas Health Science Center, Post Box 20036, Houston, TX 77025). *Virchows Arch.* [*Cell Pathol.*] 25(2):151-160; 1977.

Intestinal morphology and cell renewal were examined 72 hr following complete mechanical obstruction of the distal small intestine in gnotobiotic rats. The obstruction was produced by ligation 20 cm proximal to the ileocecal valve. Small intestine morphology and epithelial cell renewal were investigated proximal and distal to the site of obstruction. Proximal to the site of obstruction there were minor changes in villus height, base length, and in villus cell number, a large increase in depth and diameter of the crypts, and an approximately threefold increase in cell renewal. Distal to the site of obstruction there were no differences between the intestines of rats with obstruction and sham-operated controls. The apparent lack of secretion by the goblet cells and the reduced number of intra-epithelial leukocytes suggest that the barrier function of the small intestine is impaired in obstruction.

2899 REACTIVE HYPEREMIA AND OXYGEN EXTRACTION IN THE FELINE SMALL INTESTINE. (Eng.) Mortillaro, N. A.; Granger, H. J. (Coll. Medicine, Univ. South Alabama, Mobile, AL 36688). *Circ. Res.* 41(6):859-865; 1977.

Experiments were carried out to determine (a) if vasoregulation during vascular occlusion reflects a myogenic or metabolic mechanism, (b) the mechanisms used by intestinal tissue to reestablish normal blood-tissue O_2 transport following the release of vascular occlusion, and (c) the effect of vascular occlusion on intestinal aerobic metabolism. Arterial flow and oxygen extraction were continuously measured from an *in situ*, denervated loop of cat ileum. Following release of arterial occlusion of varying time periods, oxygen extraction decreased transiently, returning to control levels as the hyperemia subsided. These results suggest that the hyperemia overcompensates in attempting to repay the oxygen deficit and, consequently, oxygen extraction is depressed. In the pump-perfused preparation (constant flow), oxygen extraction rose following the release of arterial occlusion, indicating a shift to oxygen extraction as the mechanism for repaying the oxygen deficit in the absence of hyperemia. Following venous occlusion, reactive hyperemia failed to develop in most cats and, when present, was highly blunted. In addition, oxygen extraction rose transiently suggesting that, as with constant flow, this is the mechanism of oxygen debt repayment in the absence of hyperemia. With venous pressure elevation, a decrease in blood flow was coupled to an increase in oxygen extraction that resulted in an overall increase in calculated oxygen consumption; oxygen extraction progressively increased for each level of venous pressure. Estimated oxygen consumption following occlusion suggests a decrease in oxygen demand during arterial occlusion and an increased demand during venous occlusion. However, during venous occlusion, the myogenic and metabolic control mechanisms would elicit opposite effects. The blunted hyperemic response observed following venous occlusion may result from the net influence of both mechanisms acting in opposition, that is, a myogenic influence modulated by a metabolic one.

2900 EFFECTS OF ARGININE VASOPRESSIN ON CAPILLARY FILTRATION IN THE CAT ILEUM. (Eng.) Quillen, E. W.; Granger, D. N.; Taylor, A. E. (Dept. Physiology and Biophysics, Univ. Mississippi Sch. Medicine, Jackson, MS). *Gastroenterology* 73(6): 1290-1295; 1977.

The effect of local intra-arterial infusion of arginine vasopressin on capillary, interstitial, and lymphatic dynamics of the small intestine was studied in a vascularly perfused segment of cat ileum. Systemic arterial pressure, superior mesenteric arterial pressure, superior mesenteric venous pressure, blood flow, and intestinal volume were continuously monitored. Intestinal lymph flow, lymphatic protein clearance, isovolumetric capillary pressure, capillary filtration coefficient, and vascular resistances were also determined. A dose-response relation was obtained for several parameters, and a dosage of 17.5 mU/kg/min was chosen for more extensive study. At this level, vasopressin increased both systemic and local arterial pressures (from 162 mm Hg and 142 mm Hg, resp., for control levels to 172 mm Hg and 162 mm Hg, resp., while it decreased superior mesenteric venous pressure, capillary pressure, and blood flow. Precapillary, postcapillary, and total vascular resistance were all increased during the vasopressin infusion; however, a greater effect was demonstrated on the precapillary vessels as indicated by an increased pre- to postcapillary resistance ratio. Vasopressin infusion also reduced the capillary filtration coefficient, intestinal volume, lymph flow, and lymphatic protein clearance. The results establish an effect of vasopressin on transcapillary and lymphatic volume flows in the small intestine.

2901 SOME FACTORS INFLUENCING CAECAL ENLARGEMENT INDUCED BY RAW POTATO STARCH IN THE RAT. (Eng.) El-Harith, E. A.; Walker, R.; Birch, G. G.; Sukan, G. (Dept. Biochemistry, Univ. Surrey, Guildford, Surrey GU2 5XH, England). *Food Chem.* 2(4):279-289; 1977.

The phenomenon of cecal enlargement in rats fed raw potato starch as their sole dietary carbohydrate source was examined. The ceca of animals fed a diet containing 71% raw potato starch (total carbohydrate content) were enlarged 800-1,700%. They contained undigested starch, an increased number of microorganisms, and a lower concentration of ions and were of lower pH (5.5) than those of controls (pH 7.0) fed raw maize starch, extracted maize starch, or extracted potato starch. The duodenal contents had a lower specific activity of amylase expressed either as whole duodenal contents or on the basis of duodenal protein, which was also depressed. This finding suggests that the potato starch either: (a) contains an inhibitor of pancreatic amylase, (b) lacks an amylase activating or stabilizing factor, or (c) causes changes in the duodenal secretions. The resistance of potato starch to pancreatic amylase, together with the lower level of amylase in the duodenum, results in undigested starch reaching the cecum, and probably acting as a substrate there for the cecal microflora. Cecal enlargement may result from a homeostatic, adaptive mechanism to control water absorption and osmolality in the cecum.

2902 VASCULAR RESPONSES TO MECHANICAL STIMULATION OF THE MUCOSA OF THE CAT COLON. (Eng.) Fasth, S.; Hulten, L.; Lundgren, O.; Nordgren, S. (Dept. Surgery II, Univ. Goteborg, GoteBorg, Sweden). *Acta Physiol. Scand.* 101(1):98-104; 1977.

Studies were carried out in cats to determine whether a local vasodilator response similar to that in the small intestine could be elicited by mechanical stimulation of the colonic mucosa and to study the role of 5-hydroxytryptamine (5-HT) in the reflex vasodilatation associated with mechanical stimulation of the rectal mucosa. Mechanical stimulation of the mucosa of the proximal colon (by rotating a swab in the colonic lumen at laparotomy) evoked a hyperemia that also could be elicited by severing the autonomic fibers to the colon. Mechanical stimulation of the distal colon produced a hyperemia that was abolished by cutting the pelvic nerves. Afferent pelvic nerve stimulation evoked a response similar to that seen when stimulating the distal colon. Adrenergic and cholinergic receptor blocking agents did not affect the responses. Dihydroergotamine, given in doses that abolished the vascular effects of intra-arterial 5-HT, abolished the hyperemia that occurred following mechanical stimulation of the proximal colon but not that of the distal stimulation. It is concluded that a local nervous vasodilator reflex exists in the proximal colon similar to that which has been previously demonstrated in the small bowel and that the reflex vasodilatation evoked by mechanical stimulation in the distal colon is mediated via the pelvic nerves.

2903 COLONIC BASOPHIL HYPERSENSITIVITY. (Eng.) Askenase, P. W.; Boone, W. T.; Binder, H. J. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *J. Immunol.* 120(1):198-201; 1978.

Contact hypersensitivity reactions were elicited by intraluminal application of dinitrochlorobenzene (DNCB, 500 mg of a 2.5% solution) to the colon of guinea pigs. Some of the resulting lesions contained large infiltrates of basophils. These colonic basophil hypersensitivity reactions were accompanied by systemic sensitization and were not seen in nonspecific colonic inflammatory responses induced by croton oil. The heterogenous immune inflammatory responses induced in the colon by DNCB contact sensitivity may serve as a model for the study of inflammatory bowel disease.

2904 CLINDAMYCIN-ASSOCIATED COLITIS DUE TO A TOXIN-PRODUCING SPECIES OF *Clostridium* IN HAMSTERS. (Eng.) Bartlett, J. G.; Onderdonk, A. B.; Cisneros, R. L.; Kasper, D. L. (Veterans Admin. Hosp., Boston, MA 02130). *J. Infect. Dis.* 136(5):701-705; 1977.

Clindamycin-associated enterocolitis was studied in hamsters to determine whether there is a transmissible agent involved in this entity. The disease could be transferred by cecal contents and filtrates of cecal contents (pore size of filter, 0.02 μm) obtained from animals after the i.m. administration of clindamycin (6 mg/day). Subsequent work showed that enterocolitis could be produced with broth cultures of a species of *Clostridium* recovered from cecal contents of animals with clindamycin-induced disease. The cell-free supernatant of this strain also caused enterocolitis. Cecal contents from animals with clindamycin-induced disease incubated with gas gangrene antitoxin failed to cause intestinal lesions. These experiments indicate that clindamycin-associated colitis in hamsters is due to a clindamycin-resistant, toxin-producing strain of *Clostridium*.

2905 GASTROINTESTINAL AND SYSTEMIC TOXICITY OF FECAL EXTRACTS FROM HAMSTERS WITH CLINDAMYCIN-INDUCED COLITIS.

(Eng.) Rifkin, G. D.; Silva, J., Jr.; Fekety, R. (Dept. Internal Medicine, Univ. Michigan, Ann Arbor, MI). *Gastroenterology* 74(1): 52-57; 1978.

The feces of clindamycin-treated hamsters were examined for the presence of toxic substances. Clindamycin (100 mg/kg) induced enterocolitis. Suspensions derived from cecal contents of clindamycin-treated animals induced a hemorrhagic ileocecitis and death within 2 to 4 days after being given orogastrically to other hamsters. The i.p. injection of sterile filtrates of these suspensions produced an exudative peritonitis, intra-abdominal hemorrhages, and death of 80-100% of hamsters within 1 day. These effects were not seen with the i.p. injection of clindamycin or endotoxin, only small amounts of which were present in the filtrate. Incubation of the filtrate *in vitro* with polyvalent clostridial antitoxin neutralized its toxicity. *In vitro* incubation of the filtrate with normal equine serum did not reduce its *in vivo* toxicity. The toxic substance(s) contained in the filtrate was heat-labile and produced morphological changes in Y-1 adrenal cell cultures characteristic of heat-labile enterotoxins. Cecal filtrates obtained from saline-treated animals produced none of these effects. These preliminary studies suggest that enterotoxin-like substances, possibly produced by clostridia, may play an important role in the pathogenesis of clindamycin-induced colitis in the hamster.

2906 EXPERIMENTAL HAMSTER ENTERITIS: AN ELECTRON MICROSCOPIC STUDY.

(Eng.) Frisk, C. S.; Wagner, J. E. (Unit Comparative Medicine, Univ. Minnesota, Minneapolis, MN). *Am. J. Vet. Res.* 38 (11):1861-1868; 1977.

In an attempt to clarify the relationship of an intracellular organism that has been identified within the ileal epithelial cells in animals with hamster enteritis (HE) to the pathogenesis of HE, electron microscopic studies of absorptive epithelial cells were carried out in normal hamsters, hamsters with naturally occurring HE, and in hamsters with experimentally induced HE. HE was experimentally produced in weanling hamsters by the p.o. inoculation of healthy hamsters with suspensions of ilea obtained from hamsters with HE. Control groups of hamsters were inoculated p.o. with suspensions of ilea from healthy hamsters. Ilea from 6 control hamsters, 31 hamsters with experimentally produced HE, and 4 hamsters with naturally occurring HE were studied. Ultrastructural changes were not observed in the absorptive epithelium of control animals. Two different intracytoplasmic bacterial organisms were observed in epithelial cells of hamsters with experimentally produced HE. Organisms that were observed early in the disease process were identified as *Escherichia coli*. Organisms ultrastructurally similar to *Campylobacter* species were observed later in the disease and were only within hyperplastic epithelial cells. The hyperplastic ileal epithelium of hamsters with naturally occurring HE contained campylobacter-like organisms. The results suggest that a synergism between two bacterial organisms may be responsible for the lesions of HE: an enteropathogenic, cell-invasive *E. coli* causing acute enteritis, and small organisms (possibly *Campylobacter* species), which are responsible for the marked ileal cell hyperplasia of HE.

2907 IMMUNOHISTOCHEMISTRY OF CARCINOEMBRYONIC ANTIGEN: CHARACTERIZATION OF CROSS-REACTIONS WITH OTHER GLYCOPROTEINS.

(Eng.) Isaacson, P.; Judd, M. A. (General Hosp., Southampton, England). *Gut* 18(10):779-785; 1977.

In the course of demonstrating carcinoembryonic antigen (CEA) in normal human small intestine, cross-reactivity of specific antiserum against RBC, vascular endothelium, and Paneth cell granules was noted. Pretreatment of sections with periodic acid eliminated these cross-reactions without affecting the staining of CEA, indicating that the antigenic determinants shared between CEA and other glycoproteins are in the carbohydrate portion of the molecules. These findings emphasize that immunohistochemical results should be regarded with caution, even when they are apparently well controlled.

2908 THE INTERACTION OF DIETARY FIBERS AND CHOLESTEROL UPON THE PLASMA LIPIDS AND LIPOPROTEINS, STEROL BALANCE, AND BOWEL FUNCTION IN HUMAN SUBJECTS.

(Eng.) Raymond, T. L.; Connor, W. E.; Lin, D. S.; Warner, S.; Fry, M. M.; Connor, S. L. (Univ. Oregon Health Sciences Center, Portland, OR 97201). *J. Clin. Invest.* 60(6):1429-1437; 1977.

To identify any metabolic effects of dietary fiber upon cholesterol metabolism in man, six adult volunteer subjects were given eucaloric cholesterol-free formula diets, with and without added dietary fiber, for two 4-week periods. Dietary fiber consisted of 60 g of plant cell wall material (or 16 g of crude fiber) derived from corn, beans, bran, pectin, and purified cellulose. This provided about five times the fiber intake of the typical American diet. The addition of fiber to the cholesterol-free diet did not change either the plasma cholesterol level (171 ± 21 to 167 ± 18 mg/dl) or the triglyceride level (103 ± 39 to 93 ± 27 mg/dl). The excretion of both endogenous neutral steroids and bile acids were unchanged with fiber (505 ± 41 to 636 ± 75 mg/day and 194 ± 23 to 266 ± 47 mg/day, resp.). However, total fecal steroid excretion was increased (699 ± 29 to 902 ± 64 mg/day, $p<0.025$). With fiber, intestinal transit time was decreased

(59 ± 9 to 35 ± 8 hr, $p<0.005$), and both the wet and dry stool weights were greatly increased. A second group of six subjects received similar diets containing 1,000 mg cholesterol derived from egg yolk. The addition of fiber to the 1,000-mg cholesterol diet did not alter either plasma cholesterol level (233 ± 26 to 223 ± 36 mg/dl) or triglyceride level (102 ± 19 to 83 ± 11 mg/dl). The excretion of endogenous neutral steroids (618 ± 84 to 571 ± 59 mg/day), of bile acids (423 ± 122 to 401 ± 89 mg/day), and of total fecal steroids (1,041 ± 175 to 972 ± 111 mg/day) were unchanged by fiber. The absorption of dietary cholesterol was not altered when fiber was added to the 1,000-mg cholesterol diet (44.0 ± 3.3 to 42.9 ± 2.5%). A two-way analysis of variance utilizing both groups of subjects indicated a significant ($p<0.001$) effect of dietary cholesterol upon the plasma cholesterol concentration. A large quantity of dietary fiber from diverse sources has little or no effect upon the plasma lipids and sterol balance in man, in spite of the fact that intestinal transit time and stool bulk changed greatly.

2909 REMOVAL OF GASTRIN BY VARIOUS ORGANS IN DOGS. (Eng.) Strunz, U. T.; Walsh, J. H.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Bldg. 115, Rm. 115, Los Angeles, CA 90073). *Gastroenterology* 74(1):32-33; 1978.

The role of various organs in gastrin metabolism was studied in dogs. In six anesthetized dogs receiving 400 pmol/kg/hr of natural human little gastrin i.v., blood samples for radioimmunoassay of gastrin were taken repeatedly from a carotid artery, jugular vein, femoral vein, renal vein, and mesenteric vein. The calculated removal of gastrin in a single passage through these four vascular beds ranged from 21% to 30% and did not differ significantly among them. In six additional dogs, the carotid arterial to hepatic venous removal was 40%. It is concluded that the percentage removal of gastrin is about the same in all of the major vascular beds of the body.

2910 GASTROINTESTINAL EPITHELIAL RENEWAL. (Eng.) Eastwood, G. L. (West Roxbury Veterans Admin. Hosp., Boston, MA 02132). *Gastroenterology* 72(5, Part 2):962-975; 1977.

2911 EFFECT OF CHRONIC ALCOHOL INTAKE ON AMINO ACIDS [Abstract]. (Eng.) Stanko, R. T.; Morse, E. L.; Adibi, S. A. (Montefiore Hosp., Pittsburgh, PA). *Gastroenterology* 72(5, Part 2): 1136; 1977.

2912 ANTIGEN FEEDING ALTERS THE IMMUNE RESPONSES OF ANTIGEN SENSITIVE CELLS IN EXTRAINTESTINAL SITES [Abstract]. (Eng.) Kagnoff, M. F. (Univ. California, La Jolla, CA 92093). *Gastroenterology* 72(5, Part 2):1076; 1977.

2913 PRIMING OF CYTOTOXIC T CELLS BY ANTIGEN FEEDING [Abstract]. (Eng.) Kagnoff, M. F.; (Univ. California, La Jolla, CA 92093). *Gastroenterology* 72(5, Part 2):1076; 1977.

2914 AGE DEPENDENCE IN FASTING PLASMA MOTILIN: ELEVATION IN INFANTS [Abstract]. (Eng.) Mitznegg, P.; Domschke, W.; Schubert, E.; Domschke, S.; Sprugel, W.; Wunsch, E.; Demling, L. (Dept. Pharmacology, Univ. Erlangen-Nurnberg, Nurnberg, W. Germany). *Gastroenterology* 72(5, Part 2):1103; 1977.

2915 USE OF SYNTHETIC NON-SULFATED CCK-PZ AND VARIANT 39-CCK-PZ IN RADIOIMMUNOASSAY (RIA) [Abstract]. (Eng.) del Mazo, J. (Veterans Admin. Hosp., Atlanta, GA). *Gastroenterology* 72(5, Part 2):1047; 1977.

2916 ASCITES FORMATION AND REABSORPTION: A STUDY OF FLUID AND PROTEIN EXCHANGE IN PERITONEAL CAVITY OF ANESTHETIZED CATS [Abstract]. (Eng.) Zink, J. R. (Univ. Manitoba, Manitoba, Canada). *Diss. Abstr. Int.* [*B*] 38(2):537B-538B; 1977.

2917 INTESTINAL PATHOPHYSIOLOGY ASSOCIATED WITH REJECTION OF AN ENTERIC PARASITE IN IMMUNIZED AND NONIMMUNIZED HOSTS [Abstract]. (Eng.) Russell, D.; Castro, G. A. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2): 1123; 1977.

2918 "R"-LIVING VACCINE AGAINST COLIBACILLOSIS: COMMUNICATION I. (Eng.) Parnas, J.; Dam, A.; Jorgensen, J. B. (State Veterinary Serum Lab., Copenhagen, Denmark). *Zentralbl. Bakteriol. Hyg.* 237(4):494-503; 1977.

2919 TOXIC EFFECTS OF AFLATOXIN B_1 IN MALE HOLSTEIN CALVES WITH PRIOR INFECTION BY FLUKES (Fasciola hepatica). (Eng.) Osuna, O.; Edds, G. T.; Blankespoor, H. D. (Faculty Veterinary Medicine, Natl. Univ. Colombia, Bogota, Colombia). *Am. J. Vet. Res.* 38(3):341-349; 1977.

2920 USE OF ANAESTHESIA WITH KETAMINE HCl IN ASSESSING THE EMETIC ACTIVITY OF STAPHYLOCOCCAL ENTEROTOXIN B IN THE RHESUS MONKEY (Macacca Mulatta). (Eng.) Melling, J. (Microbiological Res. Establishment, Porton Down, Salisbury, Wiltshire SP4 0JG, England). *Br. J. Exp. Pathol.* 58(1):40-41; 1977.

2921 A STUDY OF THE IN VITRO AND IN VIVO INTERACTION OF BARIUM SULPHATE PARTICLES WITH GASTRO-INTESTINAL MUCUS. (Eng.) Simmonds, R. J.; James, A. M. (Dept. Chemistry, Bedford Coll., Univ. London, Regent's Park, London NW1 4NS, England). *Cytobios* 16(62):107-113; 1976.

2922 USE OF ARGON LASER IN THE TREATMENT OF UPPER G-I BLEEDING IN PRIMATES [Abstract]. (Eng.) Butler, M. L. (Letterman Army Medical Center, San Francisco, CA). *Gastroenterology* 72(5, part 2):1155; 1977.

2923 BLOOD FLOW AND OXYGEN CONSUMPTION IN THE FELINE SMALL INTESTINE; RESPONSES TO ARTIFICIAL DISTENSION AND INTESTINAL OBSTRUCTION. (Eng.) Ohman, U. (Karolinska Sjukhuset, Stockholm, Sweden). *Acta Chir. Scand.* 142(4):329-333; 1976.

2924 BACTERIAL ATTACHMENT TO ISOLATED INTESTINAL CELL MEMBRANES IN VITRO ASSAYS FOR A BACTERIAL COLONIZATION FACTOR AND A MUCOSAL RECEPTOR FOR BACTERIA [Abstract]. (Eng.) Boedeker, E. C.; Higgins, Y. K.; Formal, S. B.; Takeuchi, A. (Walter Reed Army Inst. Res., Washington, DC). *Gastroenterology* 72(5, Part 2):1154; 1977.

2925 GAS-LIQUID CHROMATOGRAPHY OF FECAL NEUTRAL STEROIDS. (Eng.) Gerhardt, K. O.; Gehrke, C. W.; Rogers, I. T.; Flynn, M. A.; Hentges, D. J. (Dept. Biochemistry, Univ. Missouri, Columbia, MO 65201). *J. Chromatogr.* 135(2):341-349; 1977.

2926 ULTRASTRUCTURE OF PROLIFERATIVE ILEITIS IN HAMSTERS (Mesocricetus auratus). (Eng.) Kim, J. C. S.; Jourden, M. (Dept. Pathology, Michigan State Univ., East Lansing, MI 48824). *Lab. Anim.* 11(3):171-174; 1977.

2927 EARLY POSTNATAL DEVELOPMENT OF THE INTESTINE IN PROGENY OF PROTEIN-DEPRIVED RATS. (Eng.) Shrader, R. E.; Ferlatte, M. I.; Zeman, F. J. (Dept. Nutrition, Univ. California, Davis, CA 95616). *Biol. Neonate* 31(3/4):181-198; 1977.

2928 ANALYSIS OF NATURAL KILLER CELL ACTIVITY IN PEYER'S PATCH CELLS OF GUINEA PIGS [Abstract]. (Eng.) Arnaud-Battandier, F.; Nelson, D. L. (Natl. Cancer Inst., Bethesda, MD 20014). *Gastroenterology* 72(5, Part 2):1154; 1977.

2929 ANTIGENS COMMON TO HUMAN OVARIAN MUCINOUS CYST FLUID AND GASTRIC MUCOSA. (Eng.) Bara, J.; Malarewicz, A.; Loisillier, F.; Burtin, P. (Institut de Recherches Scientifiques sur le Cancer, 94800 Villejuif, France). *Br. J. Cancer* 36(1):49-56; 1977.

2930 THE RELATIONSHIP BETWEEN BODY WEIGHT AND DISAPPEARANCE HALF-TIMES OF GASTRIN AND SECRETIN [Abstract]. (Eng.) Khalil, T.; Watson, L. C.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX). *Gastroenterology* 72(5, Part 2):1079; 1977.

2931 IMMUNOCHEMICAL DISTINCTION BETWEEN RAT GASTRIN AND OTHER MAMMALIAN GASTRINS [Abstract]. (Eng.) Holmquist, A. L.; Walsh, J. H.; Feldman, E. J. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1071; 1977.

2932 EFFECT OF RESTRAINT STRESS ON SERUM AND ANTRAL GASTRINS AND HEXOSAMINE SYNTHESIS AFTER PARENTERAL ALIMENTATION [Abstract]. (Eng.) Sander, L. D.; Dudrick, S. J.; Copeland, E. M.; Johnson, L. R. (Louisiana State Univ. Medical Sch., New Orleans, LA). *Gastroenterology* 72(5, Part 2):1125; 1977.

2933 AN ELECTRON MICROSCOPIC STUDY OF CHRONIC ULCERS OF THE COLON IN RATS. (Eng.) Reeve, D. R. (London Hosp. Medical Coll., Turner St., London E1 2AD, England). *Br. J. Exp. Pathol.* 58(1):63-77; 1977.

2934 EXPERIMENTAL STRESS-ULCER PROPHYLAXIS IN PIGLETS: ANTACIDS, VAGOTOMY AND VITAMIN A. (Eng.) Seufert, R. M.; Busing, M.; Gerstenbergk, L. V.; Doertenbach, J.; Becker, H.; Hottenrott, C. (Chirurg. Univ.-Klinik, 6900 Heidelberg, W. Germany). *Chir. Gastroenterol.* 10(4):367-369; 1976.

2935 DETECTION OF RECEPTORS FOR IgG Fc AND THE THIRD COMPLEMENT COMPONENT (C3) ON ISOLATED HEPATOCYTES [Abstract]. (Eng.) Hopf, U.; Meyer zum Buschenfelde, K. H.; Dierich, M. P. (Second Dept. Internal Medicine, Johannes Gutenberg Univ. Mainz, W. Germany). *Digestion* 14(5/6):458; 1976.

2936 THE EFFECTS OF ALCOHOL AND PARTIAL PORTAL LIGATION ON THE IMMUNE SYSTEM OF THE RAT [Abstract]. (Eng.) Slone, F. L.; Smith, W. I., Jr.; Van Thiel, D. H. (Univ. Pittsburgh, Pittsburgh, PA 15261). *Gastroenterology* 72(5, Part 2):1133; 1977.

2937 ANIMAL MODEL FOR AMEBIC LIVER ABSCESS [Abstract]. (Eng.) Lushbaugh, W. B.; Kairalla, A. B.; Pittman, F. E. (Veterans Admin. Hosp., Charleston, SC). *Gastroenterology* 72(5, Part 2):1091; 1977.

2938 Fasciola hepatica: BILE DUCT ENLARGEMENT INDUCED IN RATS AFTER INTRAPERITONEAL TRANSPLANTATION. (Eng.) Isseroff, H.; Girard, P. R.; Leve, M. D. (Dept. Biology, State Univ. Coll., Buffalo, NY 14222). *Exp. Parasitol.* 41(2):405-409; 1977.

2939 PHYTOHAEMAGGLUTININ (PHA) LYMPHOCYTE TRANSFORMATION: INCREASED SPLEEN SUPPRES-

SOR CELL ACTIVITY AND SPLENIC PRODUCTION OF SERUM INHIBITORY FACTORS IN A RAT EXPERIMENTAL CIRRHOSIS MODEL [Abstract]. (Eng.) MacSween, R. N. M.; Singer, C. R. J.; Folch, H.; Thomas, H. C. (Western Infirmary, Glasgow, Scotland). *Digestion* 14(5/6): 532; 1976.

2940 INVESTIGATIONS WITH ^{3}H-THYMIDINE AND ELECTRON MICROSCOPIC STUDIES IN RAT LIVERS FOLLOWING THERMOCOAGULATION OF THE THORACIC DUCT AT THE BASE OF THE NECK. (Ger.) Cremer, H.; Schattenberg, P. J.; Muller, N. (Pathologisches Institut der Universitat Bonn, D-5300 Bonn-Venusberg, W. Germany). *Res. Exp. Med. (Berl.)* 168(3): 173-186; 1976.

2941 EFFECT OF HALOTHANE ON ARTERIAL HEPATIC FLOW AS REFLECTED AT COELIAC ANGIOGRAPHY. (Eng.) Mortensson, W.; Nilsson, J. (Univ. Hosp., S-22185, Lund, Sweden). *Pediatr. Radiol.* 5(3): 183-185; 1977.

2942 THE TERMINAL HEPATIC MICROCIRCULATION IN THE RAT. (Eng.) Koo, A.; Liang, I. Y. S.; Cheng, K. K. (Dept. Physiology, Hong Kong Univ., 5 Sassoon Rd., Hong Kong). *Q. J. Exp. Physiol.* 60(4):261-266; 1977.

2943 THE NORMAL VARIATION IN LIVER BLOOD FLOW IN MAN [Abstract]. (Eng.) Smart, R. C.; Sherriff, S. B.; Taylor, I. (Sheffield Royal Infirmary, Sheffield, England). *Aust. N.Z. J. Med.* 7(3):346; 1977.

2944 INTRAVENOUS (IV) VS. INTRA-ARTERIAL (IA) VASOPRESSIN AND PRIMATE MESENTERIC BLOOD FLOW [Abstract]. (Eng.) Kerr, J. C.; Freedman, A. R.; Swan, K. G. (New Jersey Medical Sch., Newark, NJ). *Gastroenterology* 72(5, Part 2):1079; 1977.

2945 EXPERIMENTAL HEPATIC ENCEPHALOPATHY. I. CHANGES IN THE PATTERN OF SLEEP FOLLOWING PORTACAVAL SHUNT IN THE RAT. (Fre.) Monmaur, P.; Beaubernard, C.; Salomon, F.; Grange, D.; Thangapregassam, M. J.; Bismuth, H. (INSERM U-17, Hopital Paul-Brousse, 14, avenue P.-V-Couturier, F 94800 Villejuif, France). *Biol. Gastroenterol. (Paris)* 9(2):99-103; 1976.

2946 EXPERIMENTAL HEPATIC ENCEPHALOPATHY. II. STUDY OF THE RESPONSE TO NOCICEPTIVE STIMULI IN THE RAT FOLLOWING PORTACAVAL SHUNT. (Fre.) Salomon, F.; Beaubernard, C.; Thangapregassam, M. J.; Grange, D.; Bismuth, H. (INSERM U-17, Hopital Paul-Brousse, 14, avenue P.-V-Couturier, F 94800 Villejuif, France). *Biol. Gastroenterol. (Paris)* 9(2):105-108; 1976.

2947 A NEW TECHNIQUE OF EN BLOC LIVER-PANCREAS TRANSPLANTATION [Abstract]. (Eng.) Bitter-Suermann, H.; Brynger, H.; Wickstrom, J.; Gabel, H.; Save-Soderbergh, J. (McGill Univ. Cancer Res. Unit, 3655 Drummond St., Montreal, Quebec H3G 1Y6, Canada). *Eur. Surg. Res.* 9(Suppl. 1):104; 1977.

2948 MANNOSIDOSIS--PATHOGENESIS OF LESIONS IN EXOCRINE CELLS. (Eng.) Jolly, R. D.; Thompson, K. G. (Faculty Veterinary Science, Massey Univ., Palmerston North, New Zealand). *J. Pathol.* 121(1):59-62; 1977.

See also, 2785, 2792, 2816, 2839, 2883, 3133, 3268, 3336.

DIAGNOSTIC PROCEDURES

2949 DETERMINATION OF $^{14}CO_2$ IN BREATH AND ^{14}C IN STOOL AFTER ORAL ADMINISTRATION OF CHOLYL-1-[^{14}C]GLYCINE: CLINICAL APPLICATION.

(Eng.) Roda, A.; Roda, E.; Aldini, R.; Mazzella, G.; Festi, D.; Sama, C.; *et al.* (Univ. Bologna, Inst. Chemistry G. Ciamician, 40100 Bologna, Italy). *Clin. Chem.* 23(11):2127-2132; 1977.

A $^{14}CO_2$ breath test for bile acid deconjugation was developed, and the method was validated in 20 patients with intestinal bacterial overgrowth and 20 controls. $^{14}CO_2$ is measured in the breath after cholyl-1-[^{14}C]glycine administration (5 µCi, 100 g/l ethanolic solution, 5 ml, p.o.). The mean $^{14}CO_2$ output/24 hr was 11.0 ± 5.2% in controls and 54.2 ± 14.0% in bacterial overgrowth patients ($p<0.001$). The $^{14}CO_2$ excretion rate in 12 hr, when normalized to 100% of the dose at the 12th hr, gave an even finer discrimination between the two groups (no false responses). ^{14}C in stool, analyzed in 20 malabsorption patients and 20 controls by two different techniques, was 6.6 ± 4% and 31.38 ± 21.7%, resp. Bile acid malabsorption was in reasonable agreement ($r=0.67$) with percentage of "chenoid" (chenodeoxycholic acid plus ursodeoxycholic acid) in the stool by gas-liquid chromatography; a poorer correlation was observed when "chenoid" plus "choloid" (cholic acid plus its epimers) were plotted versus ^{14}C in stool ($r=0.57$, $n=15$).

2950 INTESTINAL ACTIVITIES OF TRYPSIN, LIPASE, AND PHOSPHOLIPASE AFTER A TEST MEAL: AN EVALUATION OF 474 EXAMINATIONS.

(Eng.) Ihse, I.; Arnesjo, B.; Kugelberg, C.; Lilja, P. (Dept. Surgery, Univ. Lund, S-221 85 Lund, Sweden). *Scand. J. Gastroenterol.* 12(6):662-668; 1977.

The value of indirect stimulation of the pancreas by a test meal as a routine pancreatic function test was investigated by comparing trypsin, lipase, and phospholipase concentrations in intestinal aspirates from 452 patients. Trypsin was determined in 452 subjects, lipase in 117, and phospholipase in 57. Following meal stimulation, trypsin levels were subnormal (<37 U/ml) in 88% of the 74 patients with chronic pancreatic diseases; the lipase activity was subnormal (<185 U/ml) in 80% of those with pancreatic disease, while the phospholipase activity was low in 81% of patients with chronic pancreatic disease. The outcome of repeated trypsin tests was completely consistent in 20 of 22 patients. Calculations of ratios between the enzymes studied suggested that lipase was the enzyme most susceptible to pancreatic damage. In 29 cases of celiac disease and in 18 cases in which Polya gastric resection had been performed, the decrease of the intestinal lipase concentrations was more marked than that of the other enzymes. In 9% of the cases of chronic pancreatic insufficiency, the diagnosis would have been overlooked if either lipase or trypsin had been the only enzyme determined. Enzyme determination following meal stimulation is reliable, simple, physiological, and inexpensive, and it is recommended as a routine test of the pancreatic function.

2951 TECHNIQUE FOR MICRODISSECTION AND MEASUREMENT IN BIOPSIES OF HUMAN SMALL INTESTINE.

(Eng.) Ferguson, A.; Sutherland, A.; MacDonald, T. T.; Allan, F. (Gastrointestinal Unit, Univ. Edinburgh, Edinburgh EH4 2XU, Scotland). *J. Clin. Pathol.* 30(11):1068-1073; 1977.

A microdissection and measurement technique adapted for biopsy of human small intestine is described. The technique was applied to the measurement of villi, crypts, and crypt mitotic counts in 90 specimens of normal small intestinal tissue. Specimens fixed in alcohol and acetic acid are Schiff stained in bulk. Villi and crypts are then dissected out under a dissecting microscope, placed under a coverslip, examined, measured, and the number of mitoses in individual crypts counted. With this method, specimens of normal small intestine were found to have villi 500 µm to 1,100 µm long and crypts 150 µm to 300 µm. These values were double those obtained when measuring sections of the same specimens stained with hematoxylin and eosin. The mean number of mitoses per crypt in normal duodenum and jejunum ranged from 1 to 12, and most of the cells in mitosis were in prophase or telophase. This rapid, sensitive, and inexpensive technique complements the available methods of measuring small intestinal architecture.

2952 A NEW HISTOCHEMICAL TECHNIQUE OF USE IN THE INTERPRETATION AND DIAGNOSIS OF ADENOCARCINOMA AND VILLOUS LESIONS IN THE LARGE INTESTINE.

(Eng.) Culling, C. F. A.; Reid, P. E.; Worth, A. J.; Dunn, W. L. (Dept. Pathology, Univ. British Columbia, Vancouver, British Columbia, Canada). *J. Clin. Pathol.* 30(11):1056-1062; 1977.

The periodic acid-thionin Schiff/potassium hydroxide/periodic acid-Schiff (PAT/KOH/PAS) procedure was used to investigate the histochemical staining characteristics of the mucins found in adenocarcinoma and villous lesions of the large intestine. The 46 blocks examined represented 58 lesions from 37 patients, all of whom had had resections for carcinoma of the colon. In contrast to normal colon, none of the adenocarcinomas stained red with the PAT/KOH/PAS. With two exceptions, the poorly and moderately differentiated adenocarcinomas stained blue, whereas of the well differentiated lesions half were blue and half purple. The malignant villous lesions demonstrated the same trends, although a larger percentage were purple. None of the benign lesions stained blue. Malignancy in the colon is accompanied by an increase in blue staining in the PAT/KOH/PAS technique, and such staining may be of value in the interpretation of highly atypical adenoma where it might identify the onset of malignancy. This change in staining indicates a distinct alteration in the chemistry of the mucins, which are interpreted to be a reduction in the degree of side chain O-acylation of their constituent sialic acids.

2953 PHENOTYPIC MARKERS IN HUMAN SKIN FIBROBLASTS AS POSSIBLE DIAGNOSTIC INDICES

OF HEREDITARY ADENOMATOSIS OF THE COLON AND RECTUM. (Eng.) Kopelovich, L. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *Cancer* 40(5, Suppl.):2534-2541; 1977.

The growth abnormalities of cultured human skin fibroblasts derived from normal-appearing cutaneous biopsies from subjects with hereditary adenomatosis of the colon and rectum (ACR) genotypes and from a portion of their clinically asymptomatic ACR progeny (first filial generation) are described together with the differential susceptibility of these fibroblasts to transformation by Kirsten murine sarcoma virus. These skin fibroblasts, but not cells derived from unaffected individuals, showed lack of contact inhibition, decreased serum requirement for growth, elevated levels of plasminogen activator (46.7 ± 6.5%), and alterations in the intracellular distribution of actin cables; they did not, however, grow in the absence of anchorage, nor did they form palpable tumors in congenitally athymic BALB/c *nu/nu* mice, and they were normal with regard to cholesterol feedback regulation. Skin fibroblasts from ACR subjects were 100- to 1,000-fold more susceptible to transformation by the Kirsten murine sarcoma virus than were normal cells. The virally transformed skin fibroblasts were anchorage-independent and formed tumors in athymic mice. These growth abnormalities represent steps in the changing phenotypic expression of cells undergoing neoplastic transformation. Identification of abnormal expressions associated with oncogenesis may facilitate their use as diagnostic indices for the detection of latent forms of colon cancer in man.

2954 COLORECTAL CANCER DIAGNOSIS BY A DIRECT LEUKOCYTE MIGRATION TEST USING A PANEL OF TUMOUR EXTRACTS.

(Eng.) Zoller, M.; Matzku, S.; Schulz, U. (German Cancer Res. Center, Heidelberg, W. Germany). *Cancer Immunol. Immunother.* 2(4):257-265; 1977.

Experiments were carried out to determine if the modified direct leukocyte migration test, using a panel of tumor extracts, is as useful in the detection of colorectal cancer as of gastric cancer and to study the results of this test after surgery and when metastases occurred. Peripheral WBC were pulsed with a high dose (2.5 and 0.5 mg/ml) of 3 M KCl extracts from five different colorectal tumors as well as with one 3 M KCl extract of normal colonic mucosa. Patients showing a pathological migration index (≤ 0.80 and ≥ 1.17) with three or more of the five tumor extracts were considered as "positives." With this test, 55/59 of patients with colorectal carcinomas were reactive, irrespective of the tumor stage, while only 2/27 patients with nonmalignant colorectal diseases showed a positive reaction. Patients with malignant and nonmalignant diseases of other organs were reactive in 2-3% of cases. No positive reactivity was observed with WBC from 37 healthy volunteers. When WBC were pulsed with the normal colonic mucosal extract, a pathological migration index was found in about 20% of colorectal cancer patients, but not in healthy volunteers. Evaluating 10 single-tumor extracts individually, the reactivity of cancer patients' WBC ranged from 65-89% of tests, but this difference was not statistically significant. WBC from healthy volunteers showed a pathological migration index with the different extracts in 0-6% of tests. With the leukocyte migration test, tumors of the colon, sigmoid, or rectum could not be distinguished. Patients bearing tumors in any part of the large bowel showed pathological leukocyte migration with extracts of colon, sigmoid, and rectal tumors. When the cross-reactivity study was extended to tumors of the gastrointestinal tract, it was found that patients with colorectal tumors were reactive, in a high percentage of tests, with extracts of gastric tumors, but gastric as well as esophageal and pancreatic cancer patients' WBC only reacted occasionally with colorectal tumor extracts. In the follow-up study, a positive reactivity was still found 10-14 days after surgery in 27 of 31 patients. After more than 2 months, the frequency of positive reactivity decreased to 10 of 70 cases. Patients with local recurrence or metastases exhibited positive reactivity in six of seven cases. The panel modification of the leukocyte migration test is highly sensitive and specific in the study of colorectal tumors, and it may be valuable in follow-up studies after colorectal tumor excision.

2955 THE DISTRIBUTION OF GASTRIC ULCERS: DOUBLE CONTRAST BARIUM MEAL AND ENDOSCOPY FINDINGS.

(Eng.) Stevenson, G. (McMaster Univ. Medical Center, 1200 Main St. West, Hamilton, Ontario, Canada). *Clin. Radiol.* 28(6):617-624; 1977.

To evaluate conflicting findings in the radiologic and endoscopic diagnosis of ulcers in various areas of the stomach, 1,000 consecutive double-contrast barium meals and 424 consecutive upper gastrointestinal endoscopic examinations were reviewed. Seventy gastric ulcers were found radiologically in 56 patients, and 82 gastric ulcers were found endoscopically in 70 patients. Fifty-five percent of radiologically and 53.6% of endoscopically diagnosed ulcers were located in the mid or upper body of the stomach. This distribution is contrary to previous radiological findings with the traditional barium meal. Age did not seem to be a major factor. The double-contrast meal and, in particular, the left anterior oblique view with the head elevated, display *en face* the lesser curve of the upper body around the cardia where many benign ulcers and carcinomas arise.

2956 LIVER BIOPSY: COMPLICATIONS IN 1000 INPATIENTS AND OUTPATIENTS.

(Eng.) Perrault, J.; McGill, D. B.; Ott, B. J.; Taylor, W. F. (Mayo Clinic, 200 First St. SW, Rochester, MN 55901). *Gastroenterology* 74(1):103-106; 1978.

Risk factors were evaluated prospectively in 829 outpatients and 171 inpatients who underwent liver biopsy. The two groups were similar, except that the outpatient group had a higher percentage of patients with hepatitis-cirrhosis and a lower percentage with neoplasia when compared with the inpatient group ($p<0.01$). The inpatient group had more relative contraindications ($p<0.01$). Among the total 1,000 patients, none died and none required laparotomy. If moderate to severe pain, hypotension, or both developed (5.9%), they first became manifest during a 3-hr period of observation after biopsy. Forty-four outpatients (5.3%) were hospitalized; 39 were dismissed within 36 hr and 5 within 4 days. Complications were more often experienced by those with relative contraindications ($p<0.05$) and increased number of passes ($p<0.01$). Inpatients with hepatitis-cirrhosis experienced more complications ($p<0.05$) than did patients with other diagnoses (12.8% versus 3.8%). Complications were not related to type of needle, site of entry, or experience of operator. Liver biopsy as an outpatient procedure is safe if facilities are available for 3 hr of observation and hospital support; 5% of patients will require immediate hospitalization.

2957 CLINICAL INDICATIONS AND ACCURACY OF GRAY SCALE ULTRASONOGRAPHY IN THE PATIENT WITH SUSPECTED BILIARY TRACT DISEASE.

(Eng.) Prian, G. W.; Norton, L. W.; Eule, J., Jr.; Eiseman, B. (Univ. Colorado Medical Center, Denver, CO). *Am. J. Surg.* 134(12):705-711; 1977.

The clinical efficacy of gray scale, B-mode ultrasonography was evaluated in patients with suspected biliary tract disease. One hundred patients underwent gray scale cholecystosonography (GSCS) and had diagnostic confirmation by p.o. cholecystogram (OCG) and/or operation. Ultrasonography demonstrated the gallbladder in 94 of the 100 patients; 2 patients had had previous cholecystectomy, and 3 of the 4 remaining patients had documented stones with no confirmation of a nonvisualizing OCG in the other patient. Among the 88 patients with OCG, GSCS findings correlated in 91% (2% false-positive; 7% false-negative). Among the 43 operative patients, GSCS was proven correct in 91% (no false positive; 9% false-negative). Of 12 patients with jaundice, GSCS correlated with operative findings in 75% (no false-positive; 25% false-negative). Diagnostic errors occurred in patients with very small biliary calculi, particularly when a single stone was impacted in the cystic duct. Failure to identify the gallbladder with ultrasound signifies probable cholelithiasis in the patient without previous cholecystectomy. It is concluded that: (a) GSCS is most useful when jaundice or acute illness precludes conventional studies; (2) GSCS provides an inexpensive, quick, accurate means of diagnosing cholelithiasis with a very high specificity (97%) and moderate sensitivity (88%); and (c) GSCS is the optimal diagnostic procedure for evaluating the biliary tract in the acutely ill, jaundiced, vomiting, allergic, and/or pregnant patient.

2958 GRAY SCALE ULTRASONOGRAPHY OF THE GALLBLADDER: AN EVALUATION OF ACCURACY AND REPORT OF ADDITIONAL ULTRASOUND SIGNS.

(Eng.) Anderson, J. C.; Harned, R. K. (Univ. Nebraska Medical Center, 42nd and Dewey Ave., Omaha, NB 68105). *Am. J. Roentgenol.* 129(6):975-977; 1977.

The results of ultrasound examinations of 76 patients with suspected gallbladder disease were compared with radiographic, surgical, and pathologic findings to determine the accuracy of the ultrasound examinations. In 13 patients, the gallbladder was not visualized by ultrasound. Diagnosis of the presence or absence of gallstones was correctly made by ultrasound in 56 of 63 visualized gallbladders, for an accuracy rate of 89%. A high proportion of nonvisualized gallbladders (10/13) contained gallstones. Previously unreported ultrasound findings of a stone impacted in the proximal cystic duct and findings of a collection of bile in the lesser sac associated with cholelithiasis and choledocholithiasis are illustrated.

2959 GRAY-SCALE ULTRASOUND OF BILIARY TRACT DISEASE: A CORRELATIVE STUDY WITH PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY.

(Eng.) Cooperberg, P.; Ayre-Smith, G.; Garrow, D. G. (Vancouver General Hosp., Univ. British Columbia, Vancouver, British Columbia V5Z 1M9, Canada). *J. Can. Assoc. Radiol.* 28(4):237-242; 1977.

The specificity and sensitivity of gray-scale ultrasound (US) in the detection of dilatation of intrahepatic bile ducts, as compared to percutaneous transhepatic cholangiography (PTC) was tested in 47 patients who were studied prospectively by both techniques. In 23 patients demonstrated by PTC to have dilated intrahepatic ducts, 18 were detected by US. Of the 11 patients shown to have nondilated ducts by PTC, all were accurately predicted by US. In 13 cases in which PTC was unsuccessful, the US study showed 12 to be nondilated and one to be mildly dilated. Because ultrasound is a noninvasive technique, it should be the primary imaging technique in the evaluation of possible extrahepatic obstructive jaundice.

2960 SERUM BILE ACIDS IN THE DIAGNOSIS OF HEPATOBILIARY DISEASE.

(Eng.) Pennington, C. R.; Ross, P. E.; Bouchier, I. A. D. (Ninewells Hosp. and Medical Sch., Dundee, Scotland). *Gut* 18(11): 903-908; 1977.

The value of serum bile acids (SBA) in the diagnosis of hepatobiliary disease was investigated in 14 controls, 16 patients with cirrhosis, 15 with extrahepatic obstruction, 12 with viral hepatitis, 8 with neoplasia, 7 with infectious mononucleosis, and 14 with miscellaneous diseases. A modified gas-liquid chromatographic method was used, with an overall coefficient of variation of ±11% in the control range. Serum was obtained after a 12-hr fast, and 2 hr after a fatty meal from 73 patients and 14 control subjects. In controls, the total fasting SBA of 2.17 ± 0.86 μM increased significantly ($p<0.001$) to 3.81 ± 1.14 μM after a meal. All icteric patients had raised SBA, but, in 23 anicteric patients, there was no significant difference in the detection of chronic liver disease by fasting SBA, postprandial SBA, aspartate aminotransferase, or gamma glutamyl transpeptidase. Compared with controls, serum in patients contained proportionately less deoxycholic acid ($p<0.001$); there was proportionately more cholic acid in extrahepatic obstruction ($p<0.001$) and proportionately more chenodeoxycholic acid in patients with cirrhosis, viral hepatitis, and neoplasia ($p<0.001$). In controls, the fasting cholic:chenodeoxycholic acid ratio ranged from 0.5-1.0, and differed significantly ($p<0.001$) from patients with extrahepatic obstruction 0.96-3.6, and cirrhosis 0.1-0.5. It is concluded that serum bile acids measured by sensitive methods can provide useful diagnostic information.

2961 FASTING AND POSTPRANDIAL SERUM BILE ACIDS AS A SCREENING TEST FOR HEPATOCELLULAR DISEASE. (Eng.) Angelico, M.; Attili, A. F.; Capocaccia, L. (Dept. Internal Medicine, Univ. Rome, Rome, Italy). *Am. J. Dig. Dis.* 22(11):941-946; 1977.

The significance of postprandial serum bile acid estimation as a test of liver function was evaluated in 19 normal subjects, 20 patients with cirrhosis, 10 with acute hepatitis, 4 with resolving viral hepatitis, and 6 with chronic active hepatitis. A gas-chromatographic method was used. One healthy subject had postprandial serum bile acid levels above the normal range, while seven patients with liver disease had postprandial levels within normal limits. Of the latter group, two had chronic active hepatitis in remission and three had resolving viral hepatitis. Significant correlations were seen between serum bile acid levels and most of the conventional liver function tests (total bilirubin, conjugated bilirubin, alkaline phosphatase, γ-glutamyl-transferase, cholinesterase, Hepato-Quick, and SGPT; correlation coefficients for postprandial serum bile acid levels and these liver function tests were 0.702, 0.663, 0.424, 0.067, -0.373, -0.379, 0.684, and 0.707, resp.; all significant at $p<0.001$ or $p<0.01$ except that for γ-glutamyl-transferase). These data indicate that the postprandial serum bile acid determinations is better than any of the other conventional tests taken separately, but no better than their combined use. No significant modification of the cholic acid/chenodeoxycholic acid ratio was observed between the fasting and the postprandial determinations.

2962 RADIOIMMUNOASSAY OF SERUM-CONJUGATED DEOXYCHOLIC ACID. (Eng.) Matern, S.; Krieger, R.; Hans, C.; Gerok, W. (Medizinische Universitatsklinik, Hugstetter Str. 55, D-78000 Freiburg i.Br., W. Germany). *Scand. J. Gastroenterol.* 12(6):641-647; 1977.

A specific, sensitive, and reliable radioimmunoassay for serum-conjugated deoxycholic acid is described, in which antiserum is obtained after immunization of rabbits with a deoxycholic acid-bovine serum albumin conjugate. The displacement curve of glyco[^{3}H]-deoxycholic acid was linear on a logit-log plot from 7.5 to 320 pmol of unlabeled glycodeoxycholic acid. At 50% displacement of bound label, the cross-reactivity of taurodeoxycholic acid was 100%, deoxycholic acid 30%, taurocholic acid 3%, and glycocholic acid 2%. No cross-reactivity was observed with free cholic acid, conjugated or free chenodeoxycholic acids, and conjugated or free lithocholic acids. Fasting serum-conjugated deoxycholic acid concentrations in 10 healthy volunteers ranged from 0.18 to 0.92 μM. Over a period of 5 hr following 0.5 g p.o. cholate administration, the serum-conjugated deoxycholic acid concentration did not change in five fasting healthy subjects, whereas an initial increase of serum cholic acid was observed.

2963 RADIOIMMUNOASSAY OF SULFATED LITHOCHOLATES. (Eng.) Cowen, A. E.; Korman, M. G.; Hofmann, A. F.; Turcotte, J.; Carter, J. A. (Royal Brisbane Hosp., Brisbane, Australia). *J. Lipid Res.* 18(6):698-703; 1977.

A sensitive, rapid radioimmunoassay for sulfated species of lithocholic acid (sulfolithocholylglycine, sulfolithocholyltaurine, and sulfolithocholic acid) was developed and used to measure the total concentration of sulfated lithocholates in the sera of 50 healthy human subjects. Sulfolithocholylglycine was conjugated to bovine serum albumin by a carbodiimide procedure, and the reaction product, emulsified in Freund's adjuvant, was injected intracutaneously into rabbits. The antiserum obtained was capable of binding 40% of [^{3}H]sulfolithocholylglycine at 1:1,000 dilution. The assay featured a 2-hr binding step at 42 C followed by precipitation of bound tracer with polyethylene glycol at 4 C. The assay can be used with 0.1 ml of serum and was reproducible. The antibody had little affinity for the 3-sulfate of cholic or chenodeoxycholic acid, a number of steroid sulfates, or unsulfated bile acids. In the healthy subjects, mean fasting-state serum levels of immunoreactive sulfated lithocholyl conjugates (+sulfated lithocholate) was 1.6 ± 0.1 μM; based on results with a separate radioimmunoassay for unsulfated lithocholyl conjugates, most of the lithocholate in serum in healthy humans is present in sulfated form.

2964 RADIOIMMUNOASSAY OF UNSULFATED LITHOCHOLATES. (Eng.) Cowen, A. E.; Korman, M. G.; Hofmann, A. F.; Turcotte, J.; Carter, J. A. (Royal Brisbane Hosp., Brisbane, Australia). *J. Lipid Res.* 18(6):692-697; 1977.

A new radioimmunoassay for total unsulfated species of lithocholate (lithocholylglycine, lithocholyltaurine, and lithocholate) in human serum is described, and results obtained with this method in the sera of healthy subjects are reported. Antiserum was raised in rabbits by injection of lithocholylglycine coupled to bovine serum albumin (prepared by a carbodiimide method) and emulsified in complete Freund's adjuvant; antisera capable of measuring 40-120 pmol at 1:400 dilution were obtained. The tracer was [11,12-^{3}H]lithocholylglycine. The radioimmunoassay features a 2-hr binding step at 42 C and a 1-hr separation step using polyethylene glycol. The antibody had the following relative specificities: lithocholylglycine and lithocholyltaurine, 1; lithocholate, 1.5; chenodeoxycholylglycine, 20; and deoxycholylglycine, 55. There was no binding of various other free or conjugated sulfated and unsulfated bile acids. The mean fasting-state level in 50 subjects was 0.3 µmol/l (0.14 µg/ml), but 11 of the 50 subjects had levels too low to measure by this technique. The technique is simple, rapid, and precise, and should permit the measurement of unsulfated lithocholate species in health and in some instances of liver disease.

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See also, 2648, 2668, 2921, 3020, 3021, 3025, 3032, 3042, 3043, 3044, 3045, 3076, 3091, 3092, 3140, 3161, 3166, 3167, 3186, 3188, 3204, 3210, 3213, 3214, 3215, 3220, 3226, 3233, 3234, 3235, 3237, 3238, 3239, 3274, 3284, 3288, 3314, 3332, 3340, 3352, 3353, 3370, 3376, 3399, 3401, 3413, 3422, 3424, 3447, 3448, 3466.

GASTROINTESTINAL DISEASES

ESOPHAGUS

3019 ULTRASTRUCTURAL CHANGES OF THE VAGUS NERVE IN ESOPHAGEAL ACHALASIA. (Spa.) de la Fuente, A.; Garcia-Calvo, M.; Ramon y Cajal, S.; Paya, J. M.; Cuesta, G. (Hospital Clinico de San Carlos, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(6):659-666; 1977.

Ultrastructural changes were studied in biopsy specimens of the vagus nerves from five patients with diagnostically established esophageal achalasia. The micrograms showed the predominance of amyelinated fibers; myelinated fibers were scarce and degenerated. The electron micrographs of the myelinated fibers showed frequent demyelinization with conservation of the axon and Schwann's cells with prominent nuclei and abundant cytoplasm rich in granular endoplasmic reticulum. Some Schwann's cells underwent complete demyelinization. The amyelinated fibers had only one or two axons. Atrophy of Schwann's cells was seen in some amyelinated fibers. The endoneurium was usually rich in collagen fibers, and macrophages with large cytoplasm of irregular shape containing abundant lysosomes and well-developed Golgi complexes were seen occasionally in the interfibrillar space. The findings indicate that alterations of the vagus nerve are obligatory in esophageal achalasia. These alterations appear to be of extra-esophageal origin and of degenerative and progressive character, while the lesions in the esophageal wall are secondary.

3020 DIAGNOSIS OF SYMPTOMATIC GASTROESOPHAGEAL REFLUX BY PROLONGED MONITORING OF LOWER ESOPHAGEAL pH. (Eng.) Irvin, T. T.; Perez-Avila, C. (Royal Infirmary, Sheffield S6 3DA, England). *Scand. J. Gastroenterol.* 12(6):715-720; 1977.

To evaluate the use of prolonged monitoring of the lower esophageal pH in the diagnosis of gastroesophageal reflux, the lower esophageal pH was continuously monitored for 15 hr in 10 asymptomatic subjects and 27 patients with symptoms of gastroesophageal reflux, and the pH measurements in symptomatic patients were compared with the results of other esophageal investigations. Symptomatic patients had significantly longer periods of reflux in the pH test (93.7 ± 28.9 min at pH ≤4 and 204.8 ± 36.6 min at pH ≤5) than asymptomatic subjects (4.8 ± 1.6 min at pH ≤4 and 10.7 ± 3.2 min at pH ≤5, $p<0.01$), but there was no significant correlation between the pH measurements and the results of esophageal manometry, acid perfusion, and acid clearing tests. Ten patients had evidence of esophagitis at esophagoscopy, but there was no correlation between pH measurements and the findings at esophagoscopy. Two patients with esophagitis had no evidence of reflux in the pH monitoring test. The results indicate that the pH monitoring test is useful in the diagnosis of gastroesophageal reflux in patients who do not have endoscopic signs of esophagitis. However, negative pH tests do not exclude the diagnosis of symptomatic reflux, and it appears that the test has no value in assessing the severity of esophageal inflammation.

3021 QUANTITATION OF GASTROESOPHAGEAL REFLUX BEFORE AND AFTER THERAPY USING THE GASTROESOPHAGEAL SCINTISCAN. (Eng.) Malmud, L. S.; Fischer, R. S. (Temple Univ. Sch. Medicine, Philadelphia, PA 19140). *South. Med. J.* 71(Suppl. 1): 10-15; 1978.

The scintiscanning technique was used to detect and quantitate gastroesophageal reflux before and after therapy in 30 patients with symptomatic heartburn and a positive reflux test and in 20 normal controls. In 10 patients, the reflux was studied both with and without a tube assembly with an isotopic marker positioned at the lower esophageal sphincter (LES). The scintiscans were obtained after the instillation of 300 ml of isotonic saline with 100 to 300 μCi ^{99m}Tc sulfur colloid. It was shown that reliable scintiscans can be obtained both with and without the tube. Visible reflux was detected in 27 of 30 symptomatic patients at 10-20 mm Hg, and the computed reflux index was 11.7 ± 1.8%. In 18 of 20 controls, no visible reflux was observed, while the reflux index was 2.7 ± 0.3% when pressure gradient increased to approximately 35 mm Hg. The difference in reflux indices between the two groups was significant ($p<0.001$). Changes in body position (upright versus supine) caused a decrease in reflux from 14.8 ± 3.3% to 7.6 ± 1.7% ($p<0.05$) and in LES pressure from 8.4 ± 0.08% to 6.0 ± 0.09% ($p<0.05$). An antacid-alginate preparation reduced the reflux index from 9.9 ± 1.3% to 6.5 ± 0.8% ($p<0.01$) without a significant change in LES pressure. None of the other standard diagnostic techniques (i.e., radiographic hiatal hernia, fluoroscopic reflux, LES pressure, phenol red reflux, acid perfusion, endoscopic esophagitis, and histologic esophagitis), to which the method was compared, were as sensitive. The gastroesophageal scintiscan is a reliable, noninvasive test for gastroesophageal reflux.

3022 A MULTICENTRIC, RANDOMIZED CLINICAL TRIAL OF GAVISCON IN REFLUX ESOPHAGITIS. (Eng.) McHardy, G. (Dept. Medicine, Louisiana State Univ. Medical Center, New Orleans, LA). *South. Med. J.* 71(Suppl. 1):16-21; 1978.

A multicentric evaluation of Gaviscon was performed to determine whether it is equally effective as a standard antacid in symptomatic relief of reflux esophagitis. One hundred thirty-three patients from 13 treatment centers were involved in the studies, 65 of whom received Gaviscon and 68 of whom received an antacid. Gaviscon contained 200 mg of alginic acid, 80 mg of aluminum hydroxine dried gel, 20 mg of magnesium trisilicate, and 70 mg of sodium bicarbonate per tablet. Antacid tablets were of the same physical characteristic as Gaviscon tablets and were formulated to meet the requirements of the *in vitro* test set by the Food and Drug Administration. The treatment regimens were identical in both groups. The patients were instructed to chew two tablets followed by a glass of water after each meal, at bedtime, and whenever heartburn occurred. They recorded the daily amount of medication, number and intensity of heartburn attacks, grade of relief, and the number of bowel movements. Physical examination and esophagoscopy were performed before and after the experiment. Heartburn scores, obtained by multiplying heartburn incidence by its severity, indicated no significant difference between the two treatment groups at the end of four weeks. Tablet consumption was similar in both groups. Esophagoscopy showed that Gaviscon and standard antacid were equally effective in causing a significant decrease in the severity of the specific signs of esophagitis, friability, erosion, and ulceration, as well as in such nonspecific signs as hyperemia, edema, and exudate. The low amount of antacid in Gaviscon did not cause any of the side-effects that may occur with standard antacids. Gaviscon appears to be an effective medication in the symptomatic relief of reflux esophagitis.

3023 GASTRIC EMPTYING AND ANTRAL MOTILITY IN REFLUX ESOPHAGITIS: EFFECT OF ORAL METOCLOPRAMIDE. (Eng.) Behar, J.; Ramsby, G. (Rhode Island Hosp., 593 Eddy St., Providence, RI 02902). *Gastroenterology* 74(2, Part 1):253-256; 1978.

Antral function was investigated by studying gastric emptying of the liquid phase of a meal and fasting antral contractility in 13 patients with reflux esophagitis and in 9 age-matched controls. Gastric emptying half-time ($T_{1/2}$) in reflux esophagitis patients was no different from that of control subjects ($p<0.30$). Antral contractility (number of antral contractions and the cumulative antral activity), however, was lower in reflux esophagitis patients than in control subjects ($p<0.001$). The p.o. administration of metoclopramide (15 mg) accelerated gastric emptying, increased the number of antral contractions as well as the cumulative antral activity in patients with reflux esophagitis ($p<0.001$). However, it only increased the cumulative antral activity in normal subjects ($p<0.01$). These results suggest that metoclopramide may be potentially beneficial to reflux esophagitis patients by reducing the volume of gastric contents available for gastroesophageal reflux.

3024 ANTIREFLUX SURGERY FOR SYMPTOMATIC GASTROESOPHAGEAL REFLUX: MECHANISM OF ACTION. (Eng.) Fisher, R. S.; Malmud, L. S.; Lobis, I. F.; Maier, W. P. (Temple Univ. Health Sciences Center, 3401 N. Broad St., Philadelphia, PA 19140). *Am. J. Dig. Dis.* 23(2):152-160; 1978.

To determine the effects of Nissen fundoplication upon the symptoms of reflux and on the diagnostic tests employed to evaluate reflux, and to examine the relationship between gastroesophageal reflux and lower esophageal sphincter pressure before and after fundoplication, 10 patients with symptomatic reflux were studied before and after operation. Clinical evaluation, barium esophagography, endoscopy with mucosal biopsy, esophageal manometry, acid-perfusion and acid-reflux testing, and gastroesophageal scintiscanning were performed on each patient before and after surgery. Following fundoplication, marked symptomatic, radiographic, endoscopic, and histologic improvement was observed. Serial acid-reflux tests at increasing gastroesophageal pressure gradients returned to normal after surgery. Lower esophageal sphincter (LES) pressure increased from 8.2 ± 1.3 to 12.0 ± 1.5 mm Hg ($p<0.01$). In addition, surgery resulted in a significant decrease in the gastroesophageal reflux index from 17.4 ± 2.4 to 2.7 ± 1.1% ($p<0.001$). The pre- and postoperative resting LES pressures did not correlate significantly with corresponding gastroesophageal reflux indices for individual patients. It is concluded that increased LES pressure alone does not adequately explain the functional and clinical improvement that follows fundoplication.

3025 TRANSMUCOSAL POTENTIAL DIFFERENCE: DIAGNOSTIC VALUE IN GASTRO-OESOPHAGEAL REFLUX [Abstract]. (Eng.) Khamis, B.; Kennedy, C.; Finucane, J.; Doyle, J. S. (St. Laurence's Hosp., Dublin, Ireland). *Gut* 18(11):A973-A974; 1977.

3026 PATTERN OF NOCTURNAL GASTRO-OESOPHAGEAL REFLUX [Abstract]. (Eng.) Goodall, R. J. R.; Hay, D. J.; Ward, D. W.; Temple, J. G. (Hope Hosp., Manchester, England). *Gut* 18(11):A973; 1977.

3027 SIGNIFICANCE OF MEASUREMENTS OF LOWER OESOPHAGEAL SPHINCTER PRESSURE IN PATIENTS WITH SYMPTOMATIC GASTRO-OESOPHAGEAL REFLUX [Abstract]. (Eng.) Greaney, M. G.; Chattopadhyay, D. K.; Irvin, T. T. (Royal Infirmary, Sheffield, England). *Gut* 18(11):A975-A976; 1977.

3028 GASTRO-ESOPHAGO-PHARYNGEAL REFLUX. (Eng.) Chodosh, P. L. (801 Westminster Ave., Hillside, NJ 07205). *Laryngoscope* 87(9, Part 1): 1418-1427; 1977.

3029 UPPER ESOPHAGEAL SPHINCTER DYSFUNCTION IN PATIENTS WITH ESOPHAGEAL PHARYNGEAL REGURGITATION [Abstract]. (Eng.) Shuck, T.; Gerhardt, D. C.; Winship, D. H. (Dept. Medicine, Univ. Missouri, Columbia, MO 65201). *Gastroenterology* 72(5, Part 2):1131; 1977.

3030 SURGICAL TREATMENT OF GASTROESOPHAGEAL REFLUX AND ITS COMPLICATIONS. (Eng.) Woodward, E. R. (Dept. Surgery, Univ. Florida, Gainesville, FL 32610). *World J. Surg.* 1(4):453-461; 1977.

3031 FOOD SENSITIVITY IN REFLUX ESOPHAGITIS [Abstract]. (Eng.) Price, S. F.; Smithson, K. W.; Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD). *Gastroenterology* 72(5, Part 2):1114; 1977.

3032 THE LOWER ESOPHAGEAL RING AND ESOPHAGEAL REFLUX [Abstract]. (Eng.) Scharschmidt, B. F.; Watts, H. D. (Dept. Medicine, Univ. California, San Francisco, CA). *Gastroenterology* 72(5, Part 2):1126; 1977.

3033 REFLUX ESOPHAGITIS. (Ger.) Allgower, M.; Siewert, R. (Kantonsspital d. Univ. Basel, Kantonsspital, CH-4004 Basel, Switzerland). *Langenbecks. Arch. Chir.* 341(4):231-237; 1976.

3034 QUANTITATIVE ASSESSMENT OF BETHANECHOL, ANTACID FOAM TABLETS, AND BED ELEVATION IN THERAPY OF GASTROESOPHAGEAL REFLUX [Abstract]. (Eng.) Johnson, L. F.; DeMeester, T. R. (Walter Reed Medical Center, Washington, DC). *Gastroenterology* 72(5, Part 2):1161; 1977.

3035 LOWER ESOPHAGEAL SPHINCTER (LES) DYSFUNCTION IN PATIENTS WITH EPIPHRENIC DIVERTICULA [Abstract]. (Eng.) Meunier, L.; Duranceau, A.; Hurwitz, A. (Dept. Surgery, Hotel-Dieu de Montreal, Montreal, Quebec, Canada). *Gastroenterology* 72(5, Part 2):1101; 1977.

3036 INTRAMURAL ESOPHAGEAL DIVERTICULOSIS. (Eng.) Rahlf, G.; Wilbert, L.; Lankisch, P. G.; Huttemann, U. (Inst. Pathology, Univ. Gottingen, Gosslerstr. 10, 3400 Gottingen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(2): 110-115; 1977.

3037 TREATMENT OF IRRADIATION ESOPHAGITIS--VALUE OF HYDROCORTISONE INJECTION [Abstract]. (Eng.) Nelson, R. S.; Hernandez, A. J.; Goldstein, H. M.; Saca, A. (Univ. Texas System Cancer Center, Houston, TX). *Gastroenterology* 72(5, Part 2):1107; 1977.

3038 EVIDENCE SUGGESTING PROSTAGLANDINS MEDIATE LOWER ESOPHAGEAL SPHINCTER (LES) INCOMPETENCE ASSOCIATED WITH INFLAMMATION [Abstract]. (Eng.) Brown, F.; Beck, B.; Fletcher, J.; Castell, D.; Eastwood, G. (Natl. Naval Medical Center, Bethesda, MD). *Gastroenterology* 72(5, Part 2): 1033; 1977.

3039 CAROTID ARTERY ESOPHAGEAL FISTULA AS A CAUSE OF UPPER GASTROINTESTINAL BLEEDING [Abstract]. (Eng.) Khan, S. A.; Vasu, M. (Butterworth Hosp., Grand Rapids, MI). *Gastroenterology* 72(5, Part 2):1080; 1977.

3040 SELECTIVE INTRAARTERIAL VASOPRESSIN FOR UPPER GASTROINTESTINAL HEMORRHAGE: A CONTROLLED TRIAL [Abstract]. (Eng.) Mallory, A.; Schaefer, J. W.; Cohen, J. R.; Holt, S. A.; Norton, L. W. (Denver General Hosp., Denver, CO). *Gastroenterology* 72(5, Part 2):1093; 1977.

3041 SIMPLIFIED HIATUS HERNIORRHAPHY. (Eng.) Lally, J. J.; Gist, W. W.; Petit, C. A. (Kansas City General Hosp., Medical Center, Kansas City, MO). *South Med. J.* 70(9):1086-1087; 1977.

See also, 2983, 2985, 2987, 2994, 2995, 3060, 3337, 3411, 3442, 3447, 3449, 3450, 3451.

STOMACH

3042 QUANTITATION AND IMMUNOCHEMICAL CHARACTERIZATION OF CARCINOEMBRYONIC ANTIGEN AND GLUCOSE PHOSPHATE ISOMERASE IN BLOOD AND WASHINGS OF PATIENTS WITH GASTRIC AND COLONIC DISEASES. (Eng.) Munjal, D.; Brady, P. G. (Coll. Medicine, Univ. Kentucky, Lexington, KY 40506). *Am. J. Dig. Dis.* 23(1):57-64; 1978.

Carcinoembryonic antigen (CEA) and glucose phosphate isomerase (GPI) were measured in the serum and colonic washings of 51 subjects with gastric and colonic diseases to establish the usefulness of these two markers in the diagnosis of cancer. In addition, the chromatographic and immunologic properties of CEA from colonic washings were determined and compared with the characteristics of pure CEA. The levels of both markers in the serum were higher in gastric and colonic cancer patients than in normals or patients with other diseases. Elevations of both these markers were most frequent in patients with metastases; all five patients with metastases had a CEA level greater than 2.5 ng/ml, and three of the five had a simultaneously elevated GPI level. No correlation was found between total protein content and concentrations of CEA or GPI in the washings. Further characterization of the perchloric acid-soluble material from colon washings by gel filtration indicated that the CEA-like substance from colon cancer patients was higher in molecular weight than standard radiolabeled CEA or CEA from normal colon washings. When tested against anti-CEA antiserum and pure CEA from a colonic cancer metastasis, all CEA preparations showed immunological identity in gel-diffusion plates; on immunoelectrophoresis, similar mobility was indicative of a similar charge. Determination of CEA content in colonic washings is not presently a useful diagnostic tool, and the relationship between GPI in tumors and GPI in washings is still unknown and awaits isolation and characterization from both these sources.

3043 EARLY GASTRIC CARCINOMA: VALUE OF COMBINED USE OF ENDOSCOPY, AIR CONTRAST X-RAY FILMS, CYTOLOGY, AND MULTIPLE BIOPSY SPECIMENS. (Eng.) Qizilbash, A.; Harnarine, C.; Castelli, M. (Henderson General Hosp., 711 Concession St., Hamilton, Ontario L8V 1C3, Canada). *Arch. Pathol. Lab. Med.* 101(11): 610-614; 1977.

Experience with five cases of early gastric carcinoma diagnosed during a 1-yr period at one Canadian hospital is presented. All five patients were symptomatic and were diagnosed by a combination of endoscopy, roentgenology, brush cytology, and biopsy specimens. No cases of early gastric carcinoma were diagnosed at this hospital in the preceding 10 yr. Seventy-five percent of the cytological preparations were positive, and all five biopsy specimens showed carcinoma. The ulcerated or type III lesion was present in three cases. No lymph node metastases were present in the gastrectomy specimens. The increasing rate of detection of early gastric carcinoma is attributed to the use of upper gastrointestinal endoscopy, air-contrast barium meal examinations, cytology, and multiple biopsy specimens.

3044 THE RADIOLOGICAL FEATURES OF GASTRIC LYMPHOMA. (Eng.) Privett, J. T. J.; Davies, E. R.; Roylance, J. (Coventry and Warwickshire Hosp., England). *Clin. Radiol.* 28(4):457-463; 1977.

The radiological features of 18 cases of gastric lymphoma are reviewed. The appearances on barium meal were not uniform. Localized masses were seen in seven cases; four had smooth lobulated filling defects at the fundus with sharp re-entrant angles; and three had prepyloric filling defects with sharp re-entrant angles. Thickening of the mucosal folds was seen in six cases; in two cases the abnormality involved the whole stomach and extended into the duodenum, while in four cases the fundus was spared. Local pyloric rigidity was seen in four cases, and in two of these the abnormality extended into the duodenal bulb. The greatest difficulty in the diagnosis of gastric lymphoma is distinguishing it from gastric carcinoma. Even when the barium examination is obviously abnormal, the abnormality is not always recognizable as lymphoma. The following features may be used to distinguish gastric lymphoma from gastric carcinoma: distensible stomach in the presence of a mass, mucosal hypertrophy in the presence of a mass, mucosal hypertrophy associated with large gastric ulcer or multiple gastric ulcers, contiguous spread of the abnormality into the duodenal cap, duodenal ulceration associated with gastric mass, evidence of lymphoma elsewhere, and the youth of the patient (one of the 18 patients was 16 yr old; carcinoma is extremely rare at this age).

3045 β-GLUCURONIDASE AND THE GASTRIC EPITHELIAL CELL. A STUDY USING ORGAN CULTURE. (Eng.) Tayler, R.; Orwell, R. L.; Piper, D. W. (Royal North Shore Hosp., St. Leonards, New South Wales 2065, Australia). *Digestion* 16(1/2):40-47; 1977.

In vitro studies were performed to determine the significance of an increased β-glucuronidase level in the gastric juice of patients with gastric carcinoma. Gastric mucosa obtained during surgery from patients with chronic peptic ulcer or gastric carcinoma was cultured *in vitro*, and the effects of a carcinogen (N-methyl-N^1-nitro-N-nitrosoguanidine, NG) and a cytotoxic agent (nitrogen mustard) were studied. The rate of ^{14}C-glucose and ^{3}H-glycine incorporation were measured as indices of cell viability. The content of β-glucuronidase and lactic acid in the ambient fluid and LDH isoenzyme pattern of a homogenized sample of cultured tissue were the indices characterizing carcinogenic activity. The addition of NG to cultures caused an insignificant decrease in viability, while nitrogen mustard significantly decreased the viability by 90%. NG caused a significant increase in β-glucuronidase and lactate formation in the ambient fluid, regardless of the source of the gastric mucosa. When nitrogen mustard was added to the culture, β-glucuronidase and lactate production were significantly lower than in the control medium. The mean LDH M/H ratio at the end of the experiment (120 hr) was higher in the medium of tissues cultured with NG than in control medium, but the change was statistically insignificant $(0.05<p<0.1)$. The increased production of β-glucuronidase and lactate by the gastric mucosa incubated with a carcinogen suggests that the increased β-glucuronidase activity in the gastric juice of patients indicates malignancy.

3046 CYTOPLASMIC LEUCINE NAPHTHYLAMIDASE ACTIVITY EXPRESSED IN SIGNET-RING CELL CARCINOMA OF THE STOMACH. (Eng.) Kubota, K.; Yamada, S.; Ito, M.; Nakamura, W.; Nagayo, T. (Aichi Cancer Center, Tashiro-cho, Kanokoden, Chikusa-ku, Nagoya 464, Japan). *J. Natl. Cancer Inst.* 59(6):1599-1604; 1977.

Histochemical studies were carried out in signet-ring cells in surgically resected gastric carcinomas from 64 patients. On the basis of PAS reactivity of the intracellular mucin, the signet-ring cells were classified as type A (immature), type B (intermediate), or type C (mature). Different staining reactions to Alcian blue at pH 2.5 enabled type C cells to be subclassified as C-1 or C-2. In 63/64 cases, intense leucine naphthylamidase (LNAase) activity was found in the cytoplasm of nearly all cancer cells except type C-2. Localization of LNAase activity in the cytoplasm was confirmed by conventional biochemical assay. These findings do not support the classification of the signet-ring carcinoma as a poorly differentiated adenocarcinoma. The authors believe that the signet-ring carcinoma is a cancer with some functions attributable to its cellular characteristics.

3047 GASTRIC DEVASCULARIZATION: A USEFUL SALVAGE PROCEDURE FOR MASSIVE HEMORRHAGIC GASTRITIS. (Eng.) Richardson, J. D.; Aust, J. B.

In: Transactions of the Southern Surgical Association Eighty-Eighth Annual Meeting Held at the Breakers Palm Beach, Florida, December 6, 7, 8, 1976. (Philadelphia: J. B. Lippencott Co.): 88: 157-163; 1977.

Due to poor results with conventional operative therapy for diffuse hemorrhagic gastritis (DHG), a prospective evaluation of gastric devascularization was carried out in 21 patients. Sepsis, alcoholism, and steroid abuse were the common etiologic factors. Eighteen patients had previously undergone vagotomy and pyloroplasty, and 19 patients had undergone gastric resection. In spite of the fact that these were all critically ill patients, all stopped bleeding with gastrin devascularization, and only two rebled. The average operating time was 84 min. There were two operative complications, and gastric necrosis did not occur. The mortality was high (38%) due to the primary disease. Gastric devascularization is a useful salvage procedure for the patient with DHG because it can be accomplished rapidly, with few complications, has a low rebleed rate, and causes no permanent sequelae. Gastric devascularization is in many ways the ultimate ischemic preparation for the gastric mucosa, which attests to the poor understanding of this complex disease, since only 2/21 patients rebled.

3048 BILE ACID COMPOSITION IN PATIENTS WITH AND WITHOUT SYMPTOMS OF POSTOPERATIVE REFLUX GASTRITIS. (Eng.) Gadacz, T. R.; Zuidema, G. D. (Veterans Admin. Hosp., 3900 Loch Raven Blvd., Baltimore, MD 21218). *Am. J. Surg.* 135(1):48-52; 1978.

Gastric aspirates from symptomatic and asymptomatic patients with bile reflux after operation for duodenal ulcer were quantitatively and qualitatively analyzed to determine if there is a relation between bile acid concentrations and symptoms of bile reflux after surgery. Four patients were asymptomatic, and the bile composition was normal. Three patients were symptomatic and had a significant increase in secondary bile acids (36.3% of total bile acids, compared with 13.2% in asymptomatic patients, $p<0.05$), which was accounted for by an increase in deoxycholic acid. The concentration of bile acid was similar in the two groups. This alteration in bile acid composition, with an increase in deoxycholic acid, may be an important factor in determining which patients with bile reflux develop gastritis.

3049 SIMULTANEOUS MANIFESTATION OF MENETRIER'S DISEASE. SUPERFICIAL ULCERATION (DIEULAFOY'S DISEASE) AND EARLY GASTRIC CANCER (A CASE REPORT). (Ger.) Stosiek, P.; Ebermann, W.; Varga, A. (Bezirkskrankenhaus, Girbigsdorfer Str. 1/3, DDR-89 Gorlitz, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(5/6):247-253; 1977.

Acute gastric hemorrhage prompted gastric resection in a 51-yr-old man with uneventful familial and personal anamnesis. Type IIb early gastric cancer, superficial ulceration (Dieulafoy's disease), and morphological changes typical of Menetrier's disease were found in the surgical specimen. The patient was discharged in good condition 5 weeks after surgery. Alpha-1-antitrypsin was found in the feces 1 yr after surgery. The combination of these three diseases has not been described before in the literature. Superficial erosion is not uncommon in Menetrier's disease. Many case reports and epidemiological studies show a relationship between Menetrier's disease and early gastric cancer.

3050 RECURRENCE RISKS IN COMPLEX INHERITANCE WITH SPECIAL REGARD TO PYLORIC STENOSIS. (Eng.) Lalouel, J. M.; Morton, N. E.; MacLean, C. J.; Jackson, J. (Population Genetics Lab., Univ. Hawaii at Manoa, 1980 East-West Rd., Honolulu, HI 96822). *J. Med. Genet.* 14(6):408-414; 1977.

A mixed model was applied to a body of data on pyloric stenosis to determine recurrence risks, whose incidence varies with sex, birth order, and ethnic group. Data for this analysis were drawn from three previously published studies of familial incidence of pyloric stenosis performed in Great Britain. The mixed model postulates an underlying scale of liability, to which a major locus, a polygenic component, and environment contribute independently. The major locus is assumed to be biallelic, producing three genotypes. The polygenic and environmental factors are assumed to be independent and normally distributed. Population incidences of pyloric stenosis were the input data in segregation analysis. Probability of ascertainment was established separately for each subsample because of heterogeneity among the subsamples. The hypothesis of the mixed model, the generalized single locus model, and the multifactorial model were employed in the segregation analysis. Recurrence risks of pyloric stenosis for various family histories can be computed with the program RISK, which is described. Examples were given to illustrate how risks vary with family history. It is concluded that in the majority of cases of pyloric stenosis, the method of computing the recurrence risks on the basis of the mixed model is adequate and reliable.

3051 GASTRIC EPITHELIAL CELL TURNOVER, MUCUS PRODUCTION, AND HEALING OF GASTRIC ULCERS WITH CARBENOXOLONE. (Eng.) Domschke, W.; Domschke, S.; Hagel, J.; Demling, L.; Croft, D. N. (Dept. Medicine, Univ. Erlangen-Nurnberg, Erlangen, W. Germany). *Gut* 18(10):817-820; 1977.

The effects of carbenoxolone on proliferation and mucus production were studied in 17 patients with gastric ulcer before and after ulcer healing with carbenoxolone treatment and in 19 healthy subjects. Gastric DNA loss was measured as an index of epithelial cell turnover, and *N*-acetylneuraminic acid (NANA) content of gastric juice as an index of mucus secretion. In normal subjects there was a negative correlation ($p<0.025$) between gastric DNA loss and NANA secretion: the lower the cell turnover, the higher the NANA production. In gastric ulcer patients, DNA loss or turnover was significantly ($p<0.01$) higher than normal, and fell significantly ($p<0.01$) after 4 weeks of treatment with carbenoxolone, when 16 of the 17 ulcers had healed. At the same time, NANA output increased significantly ($p<0.01$). It is suggested that patients with gastric ulcer lose cells at a high rate that is returned to normal by carbenoxolone, thus allowing the epithelial cells to mature within the mucosa and produce more mucus.

3052 FIRST CLINICAL EXPERIENCES WITH CHOLESTYRAMINE FOR THE PROPHYLAXIS OF STRESS ULCER.

(Ger.) Schumpelick, V.; Grossner, D. (Chirurgischen Universitatsklinik und -Poliklinik, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Munch. Med. Wochenschr.* 119(41):1329-1332; 1977.

Sixty-eight patients at risk of stress ulcer were treated prophylactically with cholestyramine (2 g/2 hr in 20 ml water) with a probang and/or an antacid (Gelusil Lac). Polytrauma with or without involvement of the skull and brain, surgical intervention, burn, reanimation, and sepsis were the indications of the prophylactic treatment. Forty-four patients received cholestyramine, including eight patients who also received antacid. Twenty-four patients received antacid only. None of the 44 cholestyramine-treated patients developed stress ulcer, but one patient, who received cholestyramine without antacid, had bleeding from an erosion that was controlled conservatively. Two of the 24 antacid-treated patients developed bleeding stress ulcers; 1 of them died from the indirect sequelae of the hemorrhage. No side-effects of treatment were observed. The findings indicate the effectiveness of cholestyramine in the prophylaxis of stress ulcer. The elimination of the ulcerogenic function of the duodenogastric reflux is discussed as the possible mode of action of cholestyramine.

3053 GASTRIC ULCER: EFFECT OF HEALING ON GASTRIC ACID SECRETION AND FASTING SERUM GASTRIN LEVELS.

(Eng.) Boyle, J. M.; Hurwitz, A. L.; Jones, R. S.; Mansbach, C. M., II (Univ. Hosp. Cleveland, Cleveland, OH 44106). *Am. J. Dig. Dis.* 22(12):1037-1039; 1977.

To determine whether the normal or low gastric acid output observed during active gastric ulceration is an intrinsic property of the gastric mucosa or if acid output is lowered by factors that precipitate the active ulceration, basal and peak gastric acid outputs and fasting serum gastrin levels were studied before and after healing in 15 patients with uncomplicated benign gastric ulcers. The mean basal acid output (4.0 ± 1.3 mEq H^+/hr), the mean peak acid output (29.5 ± 5.1 mEq H^+/hr), and the mean fasting serum gastrin level (80.3 ± 16.7 pg/ml) in these patients did not change significantly with healing. Failure of gastric secretory function to change with healing suggests that mucosal resistance factors are more important than gastric acid secretion in the pathogenesis of a gastric cancer.

3054 GASTRIC ULCERATION IN PATIENTS RECEIVING INTRAHEPATIC INFUSION OF 5-FLUOROURACIL.

(Eng.) Narsete, T.; Ansfield, F.; Wirtanen, G.; Ramirez, G.; Wolberg, W.; Jarrett, F. (Univ. Wisconsin Center for Health Sciences, Madison, WI). *Ann. Surg.* 186(6):734-736; 1977.

The cases of 8 patients who developed gastric ulcer, and were among 251 receiving intrahepatic arterial infusion chemotherapy for hepatic metastases, were reviewed. All patients received 5-fluorouracil (5-FU, 20-30 mg/kg for 4 days, followed by 15 mg/kg for 17 days). Bleeding occurred in four of the eight ulcer patients and perforation in one. In all cases, the catheter tip had been dislodged and was proximal to its correct position, allowing the stomach to be directly infused with 5-FU. No duodenal ulcers were noted. All patients were symptomatic for several days before the diagnosis was made. Of 20 patients with catheter dislodgement, 5 had documented ulcers, 3 had upper gastrointestinal bleeding of undetermined etiology, 8 had epigastric pain or vomiting, and only 4 were asymptomatic. Prompt determination of catheter position is necessary in patients receiving intrahepatic arterial infusion of 5-FU if symptoms consistent with gastric ulceration occur. Gastric ulcers should be vigorously treated because of the high rate of complications in patients receiving chemotherapy.

3055 ACUTE MULTIPLE GASTRIC ULCERS IN THE PYLORIC ANTRUM.

(Eng.) Yoshida, T.; Kubo, H.; Murata, H.; Ando, K.; Ishii, H.; Miyagi, F. (Saitama Medical Coll., 38 Morohongo, Moroyama, Jruma-Gun, Saitama-Ken, Japan). *Endoscopy* 9(4): 223-228; 1977.

Clinical studies on the causes and development of acute multiple gastric ulcers were performed on outpatients who suffered from fulminant epigastralgia, vomiting, and nausea. Endoscopic examination of these patients was made every few days. The ulcer presented in four clinical stages. During a preparatory (resting) period (stage 1) several minor hemorrhagic erosions in the upper part of the gastric body were found, but no abnormalities in the pyloric antrum were observed. In 25 patients (89%) who continued excessive use of liquors and food or coffee, nausea and vomiting with abrupt epigastralgia occurred, and 3 patients (10%) had hematemesis and melena. Endoscopy showed hemorrhagic erosions surrounding the pyloric sphincter. It was defined as an early ulcer stage 2. Two to five days later, the hemorrhagic erosions subsided, but symmetrical linear ulcers appeared on the pyloric sphincter, occasionally accompanied by one or two ulcers above the gastric angle (stage 3). After seven weeks of treatment, a stage of scarred healing was observed (stage 4). The disease occurred most frequently in juvenile and middle-aged patients. Its incidence increased in spring and summer. Gastric biopsies demonstrated cytomegalic inclusion bodies (CMIB). Hyperchlorhydria was found in 89% of the patients during the acute phase of the disease, but it decreased spontaneously with time. It is suggested that a virus may invade the mucosa, and CMIB obstructs the capillary endothelium, which causes erosions. Excessive ingestion of food, liquors, or coffee leads to the multiple gastric ulcers.

3056 AN ELECTRON MICROSCOPIC STUDY OF THE CILIATED CELLS IN THE HUMAN GASTRIC MUCOSA. (Eng.) Okuda, T.; Ogata, T. (Okayama Univ. Medical Sch., Okayama, 700 Japan). *Arch. Histol. Jpn.* 39(3):149-156; 1976.

The cytological features of ciliated cells found in the mucosa of the human stomach in three patients are described. In two cases, they occurred in the pyloric mucosa of patients with intestinal metaplasia who were operated on for duodenal ulcer. In the other case, they occurred within a polypoid lesion. They were located in small limited areas. The cells were densely ciliated, each cilium showing a typical 9 + 2 fibrilar pattern. Ciliated cells are not found in normal gastric mucosa, suggesting that they occur only in pathologically altered mucosa.

3057 KREBS CYCLE, PENTOSE PHOSPHATE PATHWAY, AND GLYCOLYSIS IN THE UNINVOLVED GASTRIC MUCOSA OF PEPTIC ULCER AND GASTRIC CANCER PATIENTS. (Eng.) Orwell, R. L.; Piper, D. W. (Royal North Shore Hosp. Sydney, St. Leonards, New South Wales 2065, Australia). *Gastroenterology* 73(6):1320-1325; 1977.

The body and antral mucosa of chronic peptic ulcer patients, together with the body mucosa, antral mucosa, and tumor tissue of gastric cancer patients, were compared in *in vitro* experiments as regards rates of glucose utilization, the relative contributions to glucose metabolism of the pentose phosphate pathway and Krebs cycle, and the rates of glycolysis within the tissues. $[^{14}C]$glucose counts retained by the tissue, glycolysis, and pyruvate formation were also measured. Tumor tissue from the cancer patients was included in the study. Less than 1.2% of the glucose entering the tissues was metabolized via the pentose phosphate pathway, suggesting that this pathway plays a minor role in energy production from glucose. The major determinant of energy production was the Krebs cycle. Its contribution to glucose metabolism was greatest in the body mucosa of duodenal ulcer patients, less in the uninvolved body mucosa of gastric ulcer patients, and lower still in the corresponding body mucosa of gastric cancer patients. The low levels of Krebs cycle activity seen in the latter tissue resembled those of uninvolved antral mucosa. The smallest Krebs cycle contribution was seen in tumor tissue. $[^{14}C]$glucose counts retained by the tissue and glycolysis both tended to vary inversely with Krebs cycle activity among the tissues studied. Thus, both were small in the body mucosa of noncancer patients and somewhat larger in the body mucosa of cancer patients, in uninvolved antral mucosa, and in tumor tissue.

3058 REFLUX CONTROL FOLLOWING GASTROPLASTY. (Eng.) Henderson, R. D. (Women's Medical Coll. Hosp., 76 Grenville St., Toronto, Ontario M58 1B2, Canada). *Ann. Thorac. Surg.* 24(3):206-214; 1977.

3059 TEMPORARY TUBE GASTROSTOMY: A FIVE YEAR STUDY. (Eng.) Olivencia, J. A.; Berardi, R. S. (Veterans Admin. Hosp., Des Moines, IA). *J. Iowa Med. Soc.* 67(9):362-366; 1977.

3060 THE ADVANTAGES OF COMBINING POSTERIOR GASTROPEXY WITH PROXIMAL GASTRIC VAGOTOMY. (Eng.) Sankar, M. Y.; Old, J. M.; Trinder, P.; Bose, A. A. K.; Lobo, F.; Hancock, D. M. (General Hosp., Chester Rd., Sunderland, England). *Chir. Gastroenterol.* 10(4):389-392; 1976.

3061 ELECTRICAL, CONTRACTILE, AND RADIOGRAPHIC STUDIES OF THE STOMACH AFTER PROXIMAL GASTRIC VAGOTOMY. (Eng.) Rosenquist, C. J.; Carrigg, J. W.; Regal, A. M. Y.; Kohatsu, S. (Veterans Admin. Hosp., Palo Alto, CA 94304). *Am. J. Surg.* 134(3):338-342; 1977.

3062 ENDOSCOPY OF JEJUNAL SUBSTITUTE STOMACH [Abstract]. (Eng.) Tolg, M.; Schmitt-Koppler, A. (Kreiskrankenhaus, Offenburg, W. Germany). *Endoscopy* 9(2):116; 1977.

3063 IMMUNOHISTOLOGICAL STUDY OF NORMAL EPITHELIAL ANTIGEN AND OF CEA-LIKE SUBSTANCES IN VARIOUS GASTRIC DISEASES [Abstract]. (Eng.) Rapp, W.; Wurster, K. H. (Medizinische Universitats-Klinik DKZ, Heidelberg, W. Germany). *Rend. Gastroenterol.* 9(1):78; 1977.

3064 CARCINOEMBRYONIC ANTIGEN IN GASTRIC DISEASES [Abstract]. (Eng.) Cohen, M. I.; Widerlite, L.; Bunn, P.; Nugent, P. (No affiliation given). *Gastroenterology* 72(5, Part 2): 1156; 1977.

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3066 SERUM AND MUCOSAL GASTRIN IN NORMAL AND CHRONIC ATROPHIC GASTRITIS SUBJECTS [Abstract]. (Eng.) Marletta, F.; Catalano, F.; Scollo, L.; Blasi, A. (Cattedra di Gastroenterologia dell'Universita, Catania, Italy). *Rend. Gastroenterol.* 9(1):53; 1977.

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GASTRINAEMIC STUDY [Abstract]. (Eng.) Cacciari, C.; Malaguti, P.; Sciarretta, G.; Bovani, I.; Garagnani, B.; Franceschi, F.; Fini, A. (Ospedale Maggiore, Bologna, Italy.) *Rend. Gastroenterol.* 9(1):54-55; 1977.

3068 SERUM GASTRIN LEVELS IN CHRONIC ALCOHOLICS AND NON-ALCOHOLICS WITH AND WITHOUT GASTRITIS [Abstract]. (Eng.) Zapiach, L.; Pitchumoni, C. S.; Glass, G. B. J.; Stremple, J. (New York Medical Coll., New York, NY). *Gastroenterology* 72(5, Part 2):1153; 1977.

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3070 INFLAMMATORY CELL COUNT AND IDENTIFICATION IN THE SUPERFICIAL EPITHELIUM OF CHRONIC GASTRITIS [Abstract]. (Eng.) Cheli, R.; Giacosa, A.; Molinari, F. (Ospedale Civili di Genova, Genova, Italy). *Rend. Gastroenterol.* 9(1):74-75; 1977.

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3072 GIANT MUCOSAL FOLD OF THE ANTRUM (LOCALIZED MENETRIER'S DISEASE) AS A CAUSE OF RECURRENT INTESTINAL BLEEDING. (Ger.) Roth, B.; Hell, K. (Chirurgische Klinik, Kantonsspital, CH-4410 Liestal, Switzerland). *Helv. Chir. Acta* 44(1/2):193-196; 1977.

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3076 DIAGNOSIS AND TREATMENT OF ISOLATED VARICES IN THE STOMACH [Abstract]. (Eng.) Knipper, A.; Soehendra, N.; Werner, B. (Abt. fur Allgemeinchirurgie, Chirurg. Univ.-Klinik Hamburg, Hamburg, W. Germany). *Endoscopy* 9(2):115; 1977.

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3085 PREVENTION OF STRESS ULCER BY SOMATOSTATIN IN RATS. (Eng.) Mattes, P.; Lauterbach, H. H.; Raptis, S. (Dept. General Surgery, Univ. Ulm, Steinhovelstr. 9, D-7900 Ulm/Donau, W. Germany). *Langenbecks Arch. Chir.* 341(4):297-301; 1976.

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3089 CIRCULATING ANTIBODIES TO CHEMICAL SUBSTANCES IN ALLERGIC DISEASES OF THE STOMACH. (Rus.) Kachalai, D. P.; Kozintseva, P. V. (All-Union Scientific Res. Inst. Hygiene Toxicology Pesticides, Polymers and Plastic Materials, Kiev, USSR). *Vrach. Delo* (11):139-142; 1976.

3090 ADJUVANT CHEMOTHERAPY WITH 5-FLUOROURACIL IN A GROUP OF PATIENTS WITH GASTRIC NEOPLASIA. (Ita.) Fraschini, P.; Labianca, R.; Montinari, F.; D'Antona, A.; Luporini, G. (Ospedale Maggiore S. Carlo Borromeo e Policlinico, Milan, Italy). *Terapia* 62(443):8-13; 1977.

3091 ROENTGENOLOGICAL CHARACTERISTICS OF ESOPHAGOJEJUNODUODENOPLASTY FOLLOWING GASTRECTOMY FOR CARCINOMA OF THE STOMACH. (Rus.) Kitaev, V. V.; Kuznetsov, N. A. (Dept. Roentgenology Radiology, I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):20-25; 1977.

3092 CLINICAL PICTURE, DIAGNOSIS AND TREATMENT OF GASTRIC CANCER WITH REGARD TO AGE. (Rus.) Sazonov, A. M.; Portnoy, L. M.; Marchenko, V. A.; Leonov, A. L.; Turovsky, B. M. (M. F. Vladimirskii Moscow Oblast Scientific Res. Inst. with Clinic, Moscow, USSR). *Sov. Med.* (2):95-100; 1977.

3093 REMOTE RESULTS OF SURGICAL TREATMENT OF GASTRIC CARCINOMA. (Rus.) Kalaida, L. P.; Dzhaubaev, M. O.; Shmatko, I. T.; Panko, P. P. (Stavropol Medical Inst., Stavropol, USSR). *Klin. Med.* 55(4):57-60; 1977.

See also, 2709, 2721, 2723, 2725, 2893, 2922, 2929, 2932, 2934, 2950, 2966, 2967, 2968, 2972, 2976, 2977, 2981, 2983, 2988, 2989, 3003, 3005, 3006, 3020, 3021, 3022, 3024, 3025, 3028, 3030, 3033, 3040, 3094, 3095, 3107, 3113, 3130, 3133, 3134, 3147, 3192, 3220, 3356, 3408, 3412, 3413, 3423, 3426, 3428, 3442, 3446, 3447, 3448, 3449, 3450, 3451, 3453.

STOMACH

Peptic Ulcers

3094 DYNAMIC ASPECTS OF GASTRIC EMPTYING IN PATIENTS WITH PEPTIC ULCER ACCORDING TO ULCER STAGES. (Eng.) Miyaoka, T.; Misaki, F.; Sasaki, Z.; Kimoto, K.; Kawai, K. (Kyoto Prefectural Univ. Medicine, Kawaramachi-Hirokoji, Kamigyo-ku, Kyoto, 602, Japan). *Digestion* 16(1/2):10-17; 1977.

To analyze the pattern of gastric emptying and to clarify the difference in the rate of emptying according to the site of peptic ulcer, the pattern and the time of gastric emptying were investigated in 38 patients with peptic ulcer and 7 healthy volunteers using the double-sampling method. The pattern of gastric emptying was exponential in 44% of the cases, quadratic in 29%, and unclassified in 27%. These patterns appeared to depend on the distance from the gastric angle to the pyloric ring measured from x-ray pictures in the upright position. There was no significant difference in the gastric emptying time in patients with peptic ulcer according to its site. During follow-up observations of the same case, the gastric emptying time had a tendency to shorten in patients with duodenal ulcer, while it showed no definite variation in patients with gastric ulcer.

3095 G-CELL COUNTS IN ANTRAL ENDOSCOPIC BIOPSIES BY IMMUNOFLUORESCENCE. (Eng.) Crivelli, O.; Pera, A.; Ferrari, A.; Rizzetto, M.; Lombardo, L.; Babando, G.; *et al.* (Ospedale Mauriziano Umberto I--Corso Turati 46, 10128 Torino, Italy). *Scand. J. Gastroenterol.* 12(6):721-726; 1977.

Antral gastrin-producing cells (G cells) were counted by an immunofluorescence technique in the antral biopsies obtained at endoscopy from 18 patients with duodenal ulcer, 17 patients with gastritis, and 32 individuals with a normal gastric mucosa. The G-cell count was significantly lower ($p<0.01$) in patients with duodenal ulcer (142 G cells/mm^2) in comparison to normal subjects (327 G cells/mm^2). No statistically significant correlation was found between the G-cell number and any of the other parameters tested (pentagastrin test, basal serum gastrin, and its response to a standard meal). The G-cell count could be relevant in the preoperative assessment of the G-cell density in duodenal ulcer patients.

3096 ACUTE PEPTIC ULCER IN INFANCY AND CHILDHOOD. (Eng.) Grosfeld, J. L.; Shipley, F.; Fitzgerald, J. F.; Ballantine, T. V. (Indiana Univ. Sch. Medicine, Indianapolis, IN). *Am. Surg.* 44(1):13-19; 1978.

Acute peptic ulcers were studied in 29 infants and children (15 girls and 14 boys; ages 1 day to 18 yr, mean=7.2 yr). The ulcer was a solitary lesion in all but one case, occurred equally in the duodenum (15) and stomach (14), and was associated with a 14% mortality rate. Location of the ulcer was unrelated to sex and age. Associated factors observed were "ulcerogenic" medications in 12 patients (aspirin, 7; steriods, 4; lomotil, 1), postoperative condition (following ruptured appendix in 2 and Tetralogy of Fallot in 1), burns (2), hepatic coma (1), psoriasis (1), and respiratory insufficiency (1). Diagnostically, endoscopy was the most useful procedure, with angiography and upper gastrointestinal contrast studies useful in selected cases. Treatment by ligation, vagotomy, and pyloroplasty elicited good responses in complicated cases resulting in hemorrhage. Lesser operations occasionally resulted in recurrence. Preventative measures, including postoperative and post-trauma antacid therapy in high-risk patients, are recommended, as they are preferable to any treatment course.

3097 TREATMENT OF PEPTIC ULCER DISEASE IN THE RENAL TRANSPLANT PATIENT. (Eng.) Owens, M. L.; Passaro, E., Jr.; Wilson, S. E.; Gordon, H. E. (Veterans Admin. Wadsworth Hosp. Center, Wilshire and Sawtelle Blvd., Los Angeles, CA). *Ann. Surg.* 186(1):17-21; 1977.

Previous reports of peptic ulcer disease in kidney transplant recipients are reviewed. In addition, the authors' experience with 21 cases, occurring in 115 renal transplant patients, is presented. Between 1968 and 1976, 12 transplant centers reported on gastrointestinal complications occurring in 1,853 renal transplant recipients. Among these are 52 patients in whom peptic ulcers developed before transplantation and 72 patients in whom peptic ulcers developed after transplantation. Patients who were operated on for peptic ulcer before transplant were compared with patients with peptic ulcer before transplant but who were not operated on. Ulcer recurrence was significantly lower in the operated group ($p<0.0003$). Following transplantation, 59 of 68 patients with peptic ulcer disease presented with bleeding or perforation. There were 31 deaths in 72 patients. Symptoms usually occurred early, 74% in 6 months, but 19% occurred after 1 yr. The mortality from duodenal, gastric, combined gastric and duodenal, and recurrent ulcers did not differ significantly. Elective surgery is indicated for peptic ulcer when demonstrated before or after kidney transplantation.

3098 EVALUATION OF CARBENOXOLONE SODIUM IN THE TREATMENT OF DUODENAL ULCER. (Eng.) Nagy, G. S. (14 Marshall Ave., St. Leonards, New South Wales, Australia). *Gastroenterology* 74(1):7-10; 1978.

The healing of duodenal ulcers over a 6-week period was assessed endoscopically in a double blind trial involving 21 patients on carbenoxolone and 23 patients on placebo. The two groups were adequately matched, with the exception that larger ulcers predominated in the carbenoxolone group (there were 15 patients with ulcers >1 cm in the carbenoxolone group, versus 9 in the placebo group). Relief of symptoms showed poor correlation with ulcer healing. Fourteen of the 21 patients in the carbenoxolone group and 7 of the 23 in the placebo group showed endoscopic evidence of complete healing. The result is highly significant ($p<0.016$) and confirms the therapeutic efficacy of carbenoxolone sodium positioned-release capsules in the treatment of duodenal ulcers. Side-effects of carbenoxolone therapy in the form of weight gain, rise in diastolic blood pressure, and hypokalemia were observed, but with adequate monitoring and appropriate countermeasures, no patient suffered any ill effects.

3099 ULTRASTRUCTURE OF DUODENAL EPITHELIAL CELLS IN PATIENTS WITH ACTIVE DUODENAL ULCERS AND AFTER TREATMENT WITH CIMETIDINE. (Eng.) Pillay, C. V.; Moshal, M. G.; Bryer, J. V.; Booyens, J. (Dept. Physiology, Univ. Durban-Westville, Durban, South Africa). *S. Afr. Med. J.* 52(27):1082-1085; 1977.

Comparative ultrastructural studies were carried out in biopsy specimens taken under direct vision by endoscopy from the normal duodenum, from the edge of deep and flat duodenal ulcers, and from areas 1 cm away from such ulcers. In addition, the ultrastructure of biopsy tissue from the scar of ulcers that healed after 6 weeks' therapy with cimetidine was studied. Tissue from the edge of both flat and deep duodenal ulcers showed gross pathological changes, particularly with regard to microvilli. Cells from the edge of deep ulcers showed increased secretory activity. Epithelial tissue 1 cm from flat duodenal ulcers exhibited ultrastructural changes more severe than cells 1 cm from deep duodenal ulcers. The epithelial tissue from the scar area after 6 weeks' treatment appeared capable of regaining a fully functional role, although it was abnormal (irregularly shaped microvilli) in some specimens.

3100 EFFECT OF LOW-DOSE PROPANTHELINE ON FOOD-STIMULATED GASTRIC ACID SECRETION: COM-

PARISON WITH AN "OPTIMAL EFFECTIVE DOSE" AND INTERACTION WITH CIMETIDINE. (Eng.) Feldman, M.; Richardson, C. T.; Peterson, W. L.; Walsh, J. H.; Fordtran, J. S. (Veterans Admin. Hosp., 4500 S. Lancaster Rd., Dallas, TX 75216). *N. Engl. J. Med.* 297 (26):1427-1430; 1977.

The widely held notion that anticholinergic drugs must be used in near toxic doses to inhibit gastric acid secretion effectively was re-examined, and the effect of a small dose of an anticholinergic on the inhibitory effect of an H_2-receptor antagonist was investigated. Nine patients with duodenal ulcer were studied after a low dose (15 mg) and after a near toxic dose (averaging 48 mg) of propantheline. The mean inhibition of food-stimulated acid secretion was identical with the two doses of propantheline (29 ± 10 and 29 ± 11%, resp). In addition, when 15 mg of propantheline were combined with cimetidine (300 mg), acid secretion was suppressed to a greater degree than with either drug alone. A low dose of propantheline is as effective as a near toxic dose in suppressing food-stimulated acid secretion and augments the inhibitory effect of cimetidine.

3101 EVALUATION OF DUOGASTROME (CARBENOXOLONE SODIUM) FOR THE TREATMENT OF DUODENAL ULCER: A MULTICENTRE STUDY.

(Eng.) Archambault, A.; Farley, A.; Gosselin, D.; Martin, F.; Birkett, J. P. (Centre de gastro-enterologie de Montreal, 235, est Dorchester, Ste 101, Montreal, Quebec H2X 1N8, Canada). *Can. Med. Assoc. J.* 117(10): 1155-1159; 1977.

A double-blind study of the effectiveness of carbenoxolone sodium was carried out in 152 duodenal ulcer patients. Seventy-six patients received carbenoxolone sodium capsules (50 mg, q.i.d.), and 76 received placebo capsules (q.i.d.) for 6 weeks. Evaluation of the efficacy of carbenoxolone therapy was based on data from 119/152 patients (59 test subjects and 60 controls). The ulcers healed completely (as assessed by either endoscopy or roentgenography) in 44/59 of the patients treated with carbenoxolone and in 29/60 of those treated with placebo ($p<0.01$). The proportions were similar if only endoscopical assessments are considered: 32/42 and 26/47, resp. Minor side-effects (weight gain, edema, mild hypokalemia, increase in blood pressure, and slight increases in serum concentrations of lactic dehydrogenase and alkaline phosphatase) were noted in the carbenoxolone-treated patients. Although these side-effects were not serious, close clinical monitoring by weekly visits to their physician is recommended for every patient undergoing carbenoxolone therapy, at least during the first month.

3102 EFFECT OF SOMATOSTATIN ON MEAL-INDUCED GASTRIC SECRETION IN DUODENAL ULCER PATIENTS.

(Eng.) Konturek, S. J.; Swierczek, J.; Kwiecien, N.; Mikos, E.; Oleksy, J.; Wierzbicki, Z. (Inst. Physiology, 16 Grzegorzecka St., 31-531 Krakow, Poland). *Am. J. Dig. Dis.* 22(11):981-988; 1977.

The effect of somatostatin (GH-RIH) on basal and meal-, pentagastrin-, or histamine-stimulated gastric acid and pepsin secretion was studied in six duodenal ulcer patients. Pentagastrin and histamine were infused i.v. at 2 and 25 μg/kg/hr, resp. The i.v. infusion of GH-RIH in graded doses ranging from 0.62 to 5.0 μg/kg/hr produced a dose-related inhibition of pentagastrin-induced acid secretion, reaching about 15% of control level at the dose of 5.0 μg/kg/hr. Acid inhibition was paralleled by a decrease in the pepsin output and accompanied by a dose-dependent reduction in serum growth hormone and insulin levels measured by radioimmunoassay. GH-RIH used in a single dose of 2.5 μg/kg/hr produced about 85% inhibition of acid secretion induced by a meal (measured by intragastric titration) accompanied by a significant decrease in serum gastrin and insulin levels. The effect of GH-RIH on histamine-stimulated secretion was very modest and observed only after stopping the GH-RIH infusion. Thus, GH-RIH suppresses acid and pepsin secretion induced by pentagastrin and a meal, and this effect is accompanied by a suppression of serum growth hormone and gastrin levels, which may contribute to the observed inhibition of gastric secretion.

3103 INHIBITION OF GASTRIN SECRETION BY SULPIRIDE TREATMENT IN DUODENAL ULCER PATIENTS.

(Eng.) Caldara, R.; Romussi, M.; Ferrari, C. (Fatebenefratelli Hosp., 23 Corso di Porta Nuova, 20121 Milano, Italy). *Gastroenterology* 74(2, Part 1): 221-223; 1978.

The serum gastrin response to whole beef extract was measured in 14 duodenal ulcer patients before and after sulpiride administration (100 mg). A significant inhibition of response was found both after acute i.m. injection of the drug and after p.o. administration for 1 week (100 mg/8 hr). Fasting serum gastrin was also significantly reduced after chronic treatment; gastric acid secretion did not change. Although the mechanism of the gastrin-lowering action of sulpiride is unknown, it could be mediated by some known effect(s) of the drug, such as modifications in brain monoamine metabolism or perhaps reduced growth hormone secretion.

3104 EFFECT OF VARIOUS PYLOROPLASTIES ON FECAL FAT EXCRETION IN DOGS AND HUMANS.

(Eng.) Wastell, C.; Ellis, H. (Westminster Hosp., St. Johns Gardens, London SW1P 2AP, England). *Am. J. Dig. Dis.* 23(1):45-50; 1978.

Fecal fat excretion was measured both before and after truncal vagotomy and pyloroplasty in 25 patients with chronic duodenal ulcer and in dogs before and after pyloroplasty alone. In 13 patients, the mean increase in fecal fat after truncal vagotomy and Heineke-Mikulicz pyloroplasty was 2.34 g/24 hr. After truncal vagotomy and Finney pyloroplasty in 12 patients, the increase was similar (3.09 g/24 hr). Fecal fat was also measured before and after a 3-cm, a 6-cm Heineke-Mikulicz, and a Finney type of pyloroplasty in dogs. The area resulting from the pyloroplasties was measured. Pyloroplasty resulted in a significant increase in fecal fat ($0.02<p<0.05$), but no correlation was found between the magnitude of the increase and the area that resulted from the pyloroplasties. It is concluded that, when considering which type of pyloroplasty to use after either truncal or selective vagotomy, the most important considerations are technical and relate to satisfactory drainage of the antrum.

3105 INTRINSIC FACTOR SECRETION AFTER VAGOTOMY. (Eng.) Meikle, D. D.; Bull, J.; Callender, S. T.; Truelove, S. C. (West Middlesex Hosp., Isleworth, Middlesex, England). *Br. J. Surg.* 64 (11):795-797; 1977.

To compare the effects of truncal vagotomy with highly selective vagotomy on the histological state of the gastric and duodenal mucosa, and or serum gastrin, the intrinsic factor (IF) output during basal and Histalog-stimulated gastric secretion was estimated in two series of patients with chronic duodenal ulcer before and 3 months or more after treatment by either highly selective vagotomy or truncal vagotomy and pyloroplasty. Each procedure produced significant reductions in intrinsic factor secretion after Histalog stimulation ($p<0.001$). This confirms the view expressed by previous workers that it is the vagotomy as such that is responsible for this effect, excluding the drainage procedure from any possible role. Both types of vagotomy again produced a significant reduction in IF secretion when measured 3 months or more after surgery, suggesting that the depressed IF secretion is a permanent feature and one that is postulated to become progressively more severe. In both series there was a marked reduction in IF output during the second hour of stimulated gastric secretion, indicating an early wash-out of preformed IF. This finding persisted after vagotomy.

3106 SUBGROUPS OF PEPTIC ULCER PATIENTS. (Eng.) Eckensberger, D.; Overbeck, G.; Biebl, W. (Zentrum fur Psychosomatische Medizin an der Universitat Giessen Abt. Medizinische Soziologie, Ludwigstr. 50, 6300 Giessen, W. Germany). *J. Psychosom. Res.* 20(5):485-499; 1976.

3107 HYPERGASTRINAEMIA, HYPERACIDITY AND PEPTIC ULCERATION [Abstract]. (Eng.) Hansky, J. (Dept. Medicine, Monash Univ., Melbourne, Victoria, Australia). *Rend. Gastroenterol.* 9(1):61; 1977.

3108 POTENTIATION OF MAXIMAL ACID RESPONSE IN DUODENAL ULCER SUBJECTS [Abstract]. (Eng.) Elder, J. B.; Smith, I. S. (Royal Infirmary, Manchester, England). *Eur. Surg. Res.* 8(Suppl. 2): 52-53; 1976.

3109 INTESTINAL PHASE OF GASTRIC SECRETION IN DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Konturek, S. J.; Kwiecien, N.; Sito, E.; Obtulowich, W.; Oleksy, J. (Inst. Physiology, Medical Acad., Krakow, Poland). *Gastroenterology* 72(5, Part 2):1083; 1977.

3110 DISCRIMINANT FUNCTION ANALYSIS OF SUGAR AND NITROGEN DERIVATIVES OF GASTRIC JUICE IN DUODENAL ULCERATION AND X-RAY NEGATIVE DYSPEPSIA [Abstract]. (Eng.) Donaldson, J. D.; MacRae, K. D.; Parks, T. G. (Queen's Univ. Belfast, Inst. Clinical Science, Grosvenor Rd., Belfast BT12 6BJ, Northern Ireland). *Eur. Surg. Res.* 8(Suppl. 1):58; 1976.

3111 SENSITIVITY (D_{50}) OF GASTRIC ACID SECRETION TO PROTEIN MEALS AND TO GASTRIN (G17) IN DUODENAL ULCER (DU) AND NORMAL (N) SUBJECTS [Abstract]. (Eng.) Lane, W.; Hogan, D.; Isenberg, J. I.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1087; 1977.

3112 SERUM PEPSINOGEN AND GASTRIN IN CHRONIC HEMODIALYSIS PATIENTS [Abstract]. (Eng.) Mangla, J. C.; Swamy, A.; Guarasci, G.; Cestero, R. (Monroe Community Hosp., Univ. Rochester, Rochester, NY). *Gastroenterology* 72(5, Part 2):1093; 1977.

3113 PENTAGASTRIN-INDUCED ABNORMALITY OF GASTRIC EMPTYING IN GASTRIC ULCER DISEASE [Abstract]. (Eng.) Gamblin, F. T. (Uniformed Services Univ. Health Sciences, Bethesda, MD). *Gastroenterology* 72(5, Part 2):1187; 1977.

3114 FASTING AND POST-PRANDIAL PLASMA SECRETIN CONCENTRATIONS [Abstract]. (Eng.) Straus, E.; Yalow, R. S. (Veterans Admin. Hosp., Bronx, NY). *Gastroenterology* 72(5, Part 2):1183; 1977.

3115 SOMATOSTATIN-LIKE IMMUNOREACTIVITY IN THE STOMACH AND PROXIMAL DUODENUM IN CONTROLS AND PATIENTS WITH PEPTIC ULCER [Abstract]. (Eng.) Chayvialle, J. A. P.; Descos, F.; Bernard, C.; Martin, A.; Lambert, R. (INSERM, U-45, Hopital Edouard Herriot, Lyon, France). *Gastroenterology* 72(5, Part 2):1037; 1977.

3116 PERFORATED GASTRIC ULCER SECONDARY TO GALLSTONE ILEUS. (Eng.) Reed, J. E.; Beazley, W.; Oglesby, S. E. (Stuart Circle Hosp., 413-21 Stuart Circle, Richmond, VA 23220). *Va. Med.* 103(12):890-892; 1976.

3117 GASTRIC IRRADIATION OF PEPTIC ULCER: A FOURTEEN-YEAR FOLLOW-UP [Abstract]. (Eng.) Cocco, A. E.; Mendeloff, A. I. (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Gastroenterology* 72(5, Part 2):1039; 1977.

3118 TRI-POTASSIUM DI-CITRATO BISMUTHATE: A REPORT OF ITS PHARMACOLOGICAL PROPERTIES

AND THERAPEUTIC EFFICACY IN PEPTIC ULCER. (Eng.) Brogden, R. N.; Pinder, R. M.; Sawyer, P. R.; Speight, T. M.; Avery, G. S. (Australasian Drug Information Services, P.O. Box 34-030, Birkenhead, Auckland 10, New Zealand). *Drugs* 12(6):401-411; 1976.

3119 EFFECT OF AN ANTACID REGIMEN ON THE HEALING AND PAIN OF DUODENAL ULCER (DU). A COOPERATIVE STUDY [Abstract]. (Eng.) Peterson, W. L. (Center Ulcer Res. and Education, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1112; 1977.

3120 USEFULNESS OF ANTACID-ANTICHOLINERGIC THERAPY FOR DUODENAL ULCER [Abstract]. (Eng.) Meeroff, J. C.; Chantada, C. A.; Waciarz, M.; Marchevsky, N.; Meeroff, M. (Univ. Buenos Aires, Buenos Aires, Argentina). *Gastroenterology* 72(5, Part 2):1100; 1977.

3121 EFFECT OF NIGHTTIME ANISOTROPINE METHYL BROMIDE (AMB) ON DUODENAL ULCER (DU) HEALING: A CONTROLLED TRIAL [Abstract]. (Eng.) Bowers, J.; Forbes, J.; Freston, J. (Univ. Utah Coll. Medicine, Salt Lake City, UT). *Gastroenterology* 72(5, Part 2):1032; 1977.

3122 ACID REDUCTION BY H_2-RECEPTOR ANTAGONIST VS. NEUTRALIZING ANTACID IN DUODENAL ULCER [Abstract]. (Eng.) Deering, T. B.; McCall, J. T.; Carlson, G. L.; Malagelada, J. R. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 72(5, Part 2):1046; 1977.

3123 HISTAMINE H_2-RECEPTOR ANTAGONISTS IN THE TREATMENT OF DUODENAL ULCERS. (Eng.) Bank, S.; Barbezat, G. O.; Novis, B. H.; Tim, L. O.; Odes, H. S.; Helman, C.; *et al.* (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 50(44):1781-1784; 1976.

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3125 SERUM GASTRIN LEVELS BEFORE AND AFTER 6 WEEKS OF CIMETIDINE THERAPY IN PATIENTS WITH DUODENAL ULCER. (Eng.) Bank, S.; Barbezat, G. O.; Vinik, A. I.; Helman, C. (Groote Schuur Hosp., Observatory 7925, Cape Town, South Africa). *Digestion* 15(3):157-161; 1977.

3126 DOES ORAL MAGNESIUM HYDROXIDE (Mg) PREVENT THE CALCIUM CARBONATE (Ca) INDUCED ACID REBOUND IN PATIENTS WITH DUODENAL ULCER (DU) [Abstract]? (Eng.) Holtermuller, K. H. (Dept. Medicine, Mainz, W. Germany). *Gastroenterology* 72(5, Part 2):1071; 1977.

3127 EFFECT OF TRITHIOZINE ON 24-HOUR GASTRIC ACIDITY IN DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Corinaldesi, R.; Miglioli, M.; Cornelli, U.; Cassadio, R.; Ricci, P.; Fabbri, R.; Barbara, L. (Cattedra di Gastroenterologia, Policlinico S. Orsola, Bologna, Italy). *Rend. Gastroenterol.* 9(1):70-71; 1977.

3128 THE EFFECT OF UROGASTRONE ON GASTRIC SECRETION AND SERUM GASTRIC CONCENTRATION IN DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Koffman, C. G.; Elder, J. B.; Ganguli, P. C.; Gillespie, I. E.; Gregory, H.; Geary, C. (Royal Infirmary, Manchester, England). *Gastroenterology* 72(5, Part 2):1082; 1977.

3129 THE PLACE OF HIGHLY SELECTIVE VAGOTOMY FOR PEPTIC ULCER [Abstract]. (Eng.) Duthie, H. L.; Fussey, I. V.; Irvin, T. T. (Royal Infirmary, Sheffield, England). *Gastroenterology* 72(5, Part 2):1053; 1977.

3130 REPEATED VAGOTOMY FOR RECURRENT PEPTIC ULCER AFTER FIRST INCOMPLETE VAGOTOMY. (Eng.) Alexiu, O.; Furtunescu, B.; David, S. (Babes Hosp., Rumania). *Chir. Gastroenterol.* 10(3):257-261; 1976.

3131 ACID SECRETION AND RECURRENCE AFTER SELECTIVE PROXIMAL VAGOTOMY WITHOUT DRAINAGE FOR DUODENAL ULCER [Abstract]. (Eng.) Liedberg, G.; Oscarson, J. (Dept. Surgery, Univ. Lund, S-221 85 Lund, Sweden). *Eur. Surg. Res.* 8(Suppl. 2):54-55; 1976.

3132 SERUM GASTRIN LEVELS, GASTRIC EMPTYING AND ACID OUTPUT BEFORE AND AFTER PROXIMAL GASTRIC VAGOTOMY (PGV) AND TRUNCAL VAGOTOMY AND ANTRECTOMY (TV+A) [Abstract]. (Eng.) Donovan, I. A.; Owens, C.; Poxon, V.; Clendinnen, B. G.; Harding, L. K.; Alexander-Williams, J. (Univ. Birmingham, AL). *Gastroenterology* 72(5, Part 2):1050; 1977.

3133 EPITHELIAL PROLIFERATION IN HUMAN FUNDIC MUCOSA AFTER ANTRECTOMY AND VAGOTOMY [Abstract]. (Eng.) Assad, R. T.; Eastwood, G. L.

(West Roxbury Veterans Admin. Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1025; 1977.

3134 THE PYLORUS PRESERVING GASTRECTOMY: A PROSPECTIVE CLINICAL TRIAL IN THE TREATMENT OF DUODENAL ULCERATION. (Eng.) Fielding, L. P.; Hittinger, R. (St. Mary's Hosp. Medical Sch., London, England). *Chir. Gastroenterol.* 10(3):251-255; 1976.

3135 IRON METABOLISM IN PATIENTS AFTER PARTIAL GASTRECTOMY. (Pol.) Dzoga-Litwinowicz, M. (II Klinika Chirurgii Ogolnej Instytutu Chirurgii AM, ul. Prof. Z. Kieturakisa I, 80-742 Gdansk, Poland). *Wiad. Lek.* 29(22):1981-1984; 1976.

See also, 2638, 2644, 2725, 2955, 2966, 2981, 2983, 2988, 3004, 3007, 3057, 3060, 3078, 3081, 3084, 3164, 3413, 3425, 3428.

SMALL INTESTINE

3136 ALPHA HEAVY-CHAIN DISEASE IN SOUTHERN IRAN. (Eng.) Haghshenass, M.; Haghighi, P.; Abadi, P.; Kharazmi, A.; Gerami, C.; Nasr, K. (Pahlavi Univ. Sch. Medicine, Shiraz, Iran). *Am. J. Dig. Dis.* 22(10):866-873; 1977.

A prospective study of 32 patients in Southern Iran with primary upper small intestinal lymphoma revealed 10 cases of alpha heavy-chain disease. Patients were mostly in the second and third decades of life, and the male-female ratio was 4:1. Weight loss, diarrhea, and abdominal pain were the most common complaints, and clubbing was the most frequent physical finding. Laboratory tests revealed a malabsorption pattern on intestinal x-rays, and malabsorption of xylose, fat, and vitamin B_{12} was frequently noted. Dense plasmacytic infiltrate of the lamina propria of the small bowel was the most frequent pathologic finding, while true neoplasm of the lymphoid system (i.e., immunoblastic sarcoma) was encountered in 20% of the cases.

3137 PRODUCTION OF VITAMIN B12 ANALOGUES IN PATIENTS WITH SMALL-BOWEL BACTERIAL OVERGROWTH. (Eng.) Brandt, L. J.; Bernstein, L. H.; Wagle, A. (Montefiore Hosp. and Medical Center, 111 East 210th St., Bronx, NY 10467). *Ann. Intern. Med.* 87(5):546-551; 1977.

The presence of vitamin B12 analogues (cobamides) and the bacterial conversion of ^{57}Co-B12 (vitamin B12 cyanocobalamin, [^{57}Co]CN-Cbl) into cobamides in the intestinal contents were investigated in four patients with bacterial overgrowth. The (^{57}Co)-CN-Cbl bound to intrinsic factor was given p.o. Jejunal contents were aspirated for 24 hr and cultured aerobically and anaerobically. The CN-Cbl and cobamides were separated by electrophoresis and chromatography and identified by bioautography. Radioactivity of cobamide zones from duplicate chromatograms showed bacterial conversion of (^{57}Co)-CN-Cbl into cobamides. Cobamides ([Ade]CNCba, [2-Me Ade]CNCba, [CN]$_2$Cbi, and factor E) were found in the intestinal contents in three of the four patients, and in two of three patients cobamides represented more than 25% of the administered CN-Cbl. Thus, bacterial production of cobamides, both *de novo* and from ingested CN-Cbl bound to intrinsic factor, occurs in humans with bacterial overgrowth and results in a significant loss of vitamin B12 to the host.

3138 THE CONSEQUENCES OF SMALL INTESTINAL RESECTION. (Eng.) Compston, J. E.; Creamer, B. (St. Thomas' Hosp., London, SE1, England). *Q. J. Med.* 46(184):485-497; 1977.

Forty-three patients who underwent resection of part of the small intestine were followed at a combined medical and surgical outpatient clinic. Thirty-eight patients had Crohn's disease, and in 11 patients the disease was active at the time of the study. The length of small intestine resected was 15-194 cm in the 30 patients in which this was documented. Some colon had also been resected in 41 patients. Codeine phosphate or Lomotil (diphenoxylate hydrochloride plus atropine) and dietary fat restriction were effective in controlling diarrhea in most patients, although none reached the desired target of 40 g of fat a day. Approximately half of the patients were at or above their ideal weight. Patients with active disease required more drug therapy than those without, but otherwise they were very similar. The mean hemoglobin and serum albumin levels were normal and did not differ significantly from those without active disease. Only five patients were unable to work full-time because of illness. Six patients had histological evidence of osteomalacia, one developed night blindness due to vitamin A deficiency, and vitamin K deficiency developed suddenly in one other patient. Megaloblastic anemia due to folic acid deficiency occurred in one patient who had undergone jejunal resection. It is concluded that the prognosis of patients following small bowel resection is good, even when resection has been extensive and active disease remains, provided that specific deficiencies are promptly diagnosed and treated. The length of small intestine remaining after resection seems to be unimportant in determining prognosis.

3139 OSTEOMALACIA AFTER SMALL-INTESTINAL RESECTION. (Eng.) Compston, J. E.; Ayers, A. B.; Horton, L. W. L.; Tighe, J. R.; Creamer, B. (St. Thomas' Hosp., London, SE1, England). *Lancet* 1(8054):9-12; 1978.

The prevalence of histological osteomalacia and its relationship to clinical, biochemical, and radiological variables was studied in 25 patients with small intestinal resection, and the response of 4 patients to vitamin D therapy was examined. Nine patients had osteomalacia, which was severe in five and mild in four. The serum alkaline phosphatase concentration was raised in all patients with severe osteomalacia, but serum calcium, phosphate, and alkaline phosphatase concentrations were normal in the four patients with mild disease, two of whom had symptoms. Osteomalacia was diagnosed radiologically in only three patients. Osteomalacia appears to be more common in patients with small intestinal resection than has previously been thought, and bone biopsy is essential if all cases are to be detected. High-dose parenteral (i.m.) vitamin D therapy was successful in two of three patients treated for 1 yr. The remaining patient and another patient were treated with p.o. 1α-hydroxyvitamin D_3; bone histology and biochemistry returned to normal after 6 months in both cases.

3140 SUCCESSFUL REVASCULARIZATION OF MESENTERIC INFARCTION FOLLOWING AORTOGRAPHY. (Eng.) Sumner, D. S. (St. John's Hosp., Room 292, Springfield, IL 62702). *Ann. Surg.* 43(11):743-750; 1977.

Two cases of bowel infarction following abdominal aortography are presented. In both patients, a 57-yr-old man and a 47-yr-old woman, two of the three major arteries supplying the bowel were occluded before the study. The superior mesenteric artery in one and the inferior mesenteric artery in the other were the only arteries supplying the bowel, and their lumens were reduced. After the aortogram, the residual lumen clotted, leading to bowel necrosis. Both patients survived following revascularization of the superior mesenteric artery and necrotic bowel resection.

3141 "MEDITERRANEAN ABDOMINAL LYMPHOMA," OR IMMUNOPROLIFERATIVE SMALL INTESTINAL DISEASE. PART I: CLINICAL ASPECTS. (Eng.) Salem, P. A.; Nassar, V. H.; Shahid, M. J.; Hajj, A. A.; Alami, S. Y.; Balikian, J. B.; *et al.* (American Univ. Beirut Hosp., Beirut, Lebanon). *Cancer* 40(6):2941-2947; 1977.

Twenty-five cases in one hospital of "Mediterranean abdominal lymphoma," better known as immunoproliferative small intestinal disease (IPSID) are reported. All patients were Moslem Arabs from low socioeconomic background. The mean age was 25 yr. IPSID was shown to be a distinct disease entity characterized by a triad of clinical, pathological, and immunoglobulin abnormalities. The clinical manifestations of the disease included chronic diarrhea, weight loss, diffuse abdominal pain, finger and toe clubbing, and occasionally palpable peripheral lymph nodes. Radiological studies revealed a malabsorption pattern with evidence of mucosal fold thickening, segmentation, and flocculation of barium. Laboratory investigations showed evidence of malabsorption, hypoalbuminemia, and hypocalcemia. Two patients had no evidence of malabsorption. Nine patients had serum alpha heavy chain protein. However, intestinal fluid immunoelectropheresis and immunofluorescence studies on involved intestinal mucosa were not performed, and alpha heavy chain disease (αHCD) thus could not be excluded in the remaining 16 patients. A new staging classification is proposed, and the role of laparotomy in staging is emphasized. In five patients, mesenteric lymph nodes harbored immunoblastic sarcoma; in the same patients, a benign-appearing lymphoplasmacytic cellular infiltrate was present in the intestinal mucosa. Three patients had histologically proven lymphoma in the peripheral lymph nodes, and all had αHCD. Lymphomatous involvement of distant organs was not observed. One patient with αHCD was considered to be in the premalignant phase of IPSID. The prognosis was poor, as the majority of patients succumbed within 2 yr after diagnosis. The significance of early detection is emphasized.

3142 THE EFFECT OF JEJUNOILEAL BYPASS ON BILE COMPOSITION AND THE FORMATION OF BILIARY CALCULI. (Eng.) Wise, L.; Stein, T. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY 11040). *Ann. Surg.* 187(1):57-62; 1978.

The effect of jejunoileal bypass on the incidence of gallstone formation, on the frequency of cholesterol saturation, and on biliary lipid composition was investigated in 101 morbidly obese patients. Nine patients developed biliary calculi postoperatively during a mean follow-up period of 29.6 months. In eight consecutive patients, the lithogenicity of bile was assessed by methods that are dependent on cholesterol saturation. Postoperatively, the lithogenic score decreased in six and increased in two patients, one of whom developed gallstones. The biliary glycine/taurine ratio increased ($p<0.05$) from 4.6 to 5.9 postoperatively. These results suggest that the increased incidence of cholelithiasis following small bowel bypass is not only due to a relative change in bile composition but is probably more significantly due to an increase in the biliary glycine/taurine ratio and a consequent decrease in the biliary zeta potential.

3143 HEPATIC INTRAMITOCHONDRIAL FILAMENTS IN MORBIDLY OBESE PATIENTS UNDERGOING INTESTINAL BYPASS. (Eng.) Friedman, H. I.; Chandler, J. G.; Nemeth, T. J. (Letterman Army Inst. Res., Presidio of San Francisco, San Francisco, CA 94129). *Gastroenterology* 73(6):1353-1361; 1977.

To determine whether the presence of hepatocyte intramitochondrial filaments (IMFs) indicate a mitochondrial response to an altered cellular metabolic environment, the characteristics of these filaments were studied in 16 patients undergoing jejunal ileal bypass for morbid obesity. At the time of bypass, all of the liver biopsies showed varying degrees of steatosis, and IMFs were present in 13 of the 16 operative specimens. The IMFs were most prominent in the periportal cells, whereas the intracellular lipid was concentrated in centrilobular cells. Midzonal hepatocytes were intermediate in both respects. The IMFs were more abundant in biopsies showing moderate steatosis than in those with marked lipid accumulation in which the IMFs were limited to hepatocytes in juxtaposition to portal triads. The IMFs appeared to originate from mitochondrial cristae. When steatosis resolved 12 to 18 months after intestinal bypass, the prevalence of IMFs diminished also. The presence of IMFs may be ultrastructural evidence of an adaption to an altered metabolic environment, which resolves when the inciting influence is removed.

3144 ROLE OF CALORIC INTAKE IN THE WEIGHT LOSS AFTER JEJUNOILEAL BYPASS FOR OBESITY.

(Eng.) Condon, S. C.; Janes, N. J.; Wise, L.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Gastroenterology* 74(1):34-37; 1978.

To investigate the role of decreased caloric intake in the weight loss observed in patients after jejunoileal bypass for obesity, 65 patients were studied prospectively after this procedure. Dietary intake pre- and postoperatively was measured either directly by weighing food or by a research dietary history. Of 65 measurements, 59 were made at least 6 months after operation, when, over 75% of weight loss had been achieved. Fat absorption was measured in 42 patients. The entire group ate fewer calories (2,595 ± 135 cal) postoperatively than preoperatively (3,261 ± 138 cal). This difference was highly significant ($p<0.001$). Forty-eight patients ate less after their operation. The caloric deficit calculated from the observed weight loss could be accounted for entirely by the estimated decrease in intake in 22 of the 48 patients who ate less postoperatively. Moreover, measured fat malabsorption accounted for only 31% of the observed weight loss in those who ate more postoperatively and 21% in those who ate less. It is concluded that a decrease in caloric intake, along with malabsorption, is an important factor in the long term postoperative weight loss (1-9 months) after jejunoileal bypass for obesity.

3145 ABSENCE OF MUCOSAL ATROPHY IN HUMAN SMALL INTESTINE AFTER PROLONGED ISOLATION.

(Eng.) Tompkins, R. K.; Waisman, J.; Watt, C. M. H.; Corlin, R.; Keith, R. (Univ. California Los Angeles Sch. Medicine, Los Angeles, CA 90024). *Gastroenterology* 73(6):1406-1409; 1977.

Segments of isolated human jejunum (bypassed for 3.33 yr in treatment of morbid obesity) and ileum (bypassed for 6 yr as a Thiry-Vella fistula in treatment of postsurgical fistula) were examined histologically and ultrastructurally. There was no obvious evidence of widespread mucosal atrophy in either case. These findings contrast with those reported in experimental animals and in most human patients with ileal urinary conduits, where atrophy of the isolated segment is the rule. Nonluminal factors in humans may be sufficient to maintain small intestinal mucosa for long periods in the absence of intestinal chyme.

3146 IDIOPATHIC INTESTINAL PSEUDOOBSTRUCTION: RESPONSE TO DRUGS.

(Eng.) Lewis, T. D.; Daniel, E. E.; Sarna, S. K.; Waterfall, W. E.; Marzio, L. (McMaster Univ. Medical Center, 4W8, 1200 Main St., West, Hamilton, Ontario L8S 4J9, Canada). *Gastroenterology* 74(1):107-111; 1978.

Intraluminal recordings of motility were made from a patient with chronic idiopathic intestinal pseudoobstruction. Contractile activity was recorded from the esophagus and duodenum with and without cholinergic stimulation. Electrical activity was recorded from the duodenum with and without cholinergic stimulation. Contractile and electrical activities were recorded from the sigmoid colon at rest and after morphine administration (5 mg, i.v.). Gastric fundic relaxation was measured during balloon distention. This patient showed abnormalities of esophageal function similar to achalasia, while gastric fundic relaxation was impaired, with a more rapid rise in pressure on distention than was seen in five normal subjects. Duodenal and colonic electrical control and response activities were present on occasion. Duodenal contractions occurred in response to both bethanechol (5 mg, s.c.) and edrophonium (6-7 mg, i.v.). Therefore, the efferent cholinergic system of the small bowel appears to be functional in this case of idiopathic intestinal pseudo-obstruction. The nonadrenergic inhibitory control of esophagus and gastric fundus appears to be functioning abnormally.

3147 POSTOPERATIVE GASTROINTESTINAL ELECTRICAL AND MECHANICAL ACTIVITIES IN A PATIENT WITH IDIOPATHIC INTESTINAL PSEUDOOBSTRUCTION.

(Eng.) Sarna, S. K.; Daniel, E. E.; Waterfall, W. E.; Lewis, T. D., Marzio, L. (McMaster Univ. Medical Center, 4W8, 1200 Main St. West, Hamilton, Ontario L8S 4J9, Canada). *Gastroenterology* 74(1):112-120; 1978.

Studies were carried out, after laparotomy, *in vivo*, and *in vitro* on the stomach and small intestine of a patient with severe idiopathic intestinal pseudo-obstruction. Gastrointestinal electrical activities were recorded *in vivo* for 7 days postoperatively by 10 sets of bipolar electrodes implanted seromuscularly in the jejunum on both sides of an anastomosis, and in the stomach. The jejunal electrical control activity (ECA) frequency was very low (4.75 ± 5.34 cycles/min) and highly irregular immediately postoperatively, but its frequency and regularity improved over the next hour. Then ECA disappeared except during the occurrence of a migrating myoelectrical complex (MMC) at the recording sites. The mean duration of 28 MMCs was 5.91 ± 2.79 min. The mean interval between successive MMCs was 34.7 ± 18.9 min. Drugs like meperidine as well as small doses of prostaglandin $F_{2\alpha}$ (2.5 μg/min) initiated MMCs, whereas morphine, pentagastrin, and larger doses of prostaglandin $F_{2\alpha}$ initiated ECA with electrical response activity simultaneously at all electrodes. Feeding ice cubes or a cup of tea also induced irregular ECA with electric response activity superimposed on it. Electrical stimulation during the absence of ECA could not restore it. When ECA was present, electrical stimulation could decrease but not increase the frequency of ECA, presumably because it was maximal. *In vitro* studies on longitudinal and circular muscle strips from a segment of jejunum removed at laparotomy showed that the responses to transmural stimulation of intrinsic cholinergic or nonadrenergic inhibitory nerves and to drugs like acetylcholine, carbamoylcholine, physostigmine, serotonin, catecholamines, and ATP differed only quantitatively from responses to similar strips from normal small intestine. The total absence of ECA except during a MMC may be responsible for the motility disorder in this patient. Vagal activity may be essential for initiation of MMCs; if so, the efferent cholinergic system appeared to function. Idiopathic intestinal pseudo-obstruction did not result from primary impairment of muscle contractile function, or of receptors to nerve mediator function of intrinsic cholinergic or nonadrenergic inhibitory nerves. Hyperpolarization of intestinal smooth muscle may explain the absence of ECA and most other motility abnormalities in this patient.

3148 STAGNANT LOOP SYNDROME IN PATIENTS WITH CONTINENT ILEOSTOMY (INTRA-ABDOMINAL ILEAL RESERVOIR). (Eng.) Schjonsby, H.; Halvorsen, J. F.; Hofstad, T.; Hovdenak, N. (5016 Haukeland Hosp., Norway). *Gut* 18(10):795-799; 1977.

Intestinal absorption and bacteriology of the ileal contents were compared in seven patients with continent ileostomy and seven patients with conventional ileostomy. The absorption of vitamin B_{12} was reduced in five patients with continent ileostomy and subnormal in two patients with conventional ileostomy. Steatorrhea was present in four patients with continent and one patient with conventional ileostomy. Increased concentrations of total anaerobic bacteria and *Bacteroides* were found in the ileum of the patients with continent ileostomy. After a p.o. dose of $[1\text{-}^{14}C]$glycocholic acid there was no difference in the fecal excretion of radioactivity, whereas the $^{14}CO_2$-expiration was increased in two patients with continent ileostomy. In four patients with continent ileostomy and malabsorption of B_{12}, there was evidence of a stagnant loop syndrome, as p.o. lincomycin treatment resulted in increased absorption of B_{12}, decreased excretion of fecal fat, and decreased concentrations of *Bacteroides* in the ileum. These studies suggest that malabsorption was caused by the stagnant loop syndrome in four of the seven patients with a continent ileostomy.

3149 THE BRUSH BORDER MEMBRANE IN HEREDITARY SUCRASE-ISOMALTASE DEFICIENCY: ABNORMAL PROTEIN PATTERN AND PRESENCE OF IMMUNOREACTIVE ENZYME. (Eng.) Freiburghaus, A. U.; Dubs, R.; Hadorn, B.; Gaze, H.; Hauri, H. P.; Gitzelmann, R. (Gastrointestinal Unit, Univ. Berne, Berne, Switzerland). *Eur. J. Clin. Invest.* 7(5):455-459; 1977.

A micromodification of the Schmitz technique for the isolation of brush border membrane fragments allowed the investigation of the molecular mechanisms responsible for hereditary sucrase-isomaltase deficiency in a child with this disorder. The method allows the analysis of membrane proteins using as little as 10 μg of protein, which permits the study of the protein composition of isolated membrane fragments, the visualization of the enzyme *in situ*, and the measurement of the total enzymatic activity in the homogenate using a single biopsy specimen. Immunoreactive enzyme was present in the intact duodenal mucosa. Polyacrylamide gel electrophoresis carried out with membrane fragments of an intestinal biopsy showed an abnormal protein band without enzyme activity. The mucosa had a relatively high residual isomaltase activity, which was recovered from the gel in a position suggesting higher than normal molecular weight. The results indicate that, in this patient, the primary structural defect was in the sucrase moiety, which was enzymatically inactive. The isomaltase subunits may have aggregated into a large molecular weight complex because of unavailability of their partners. The observation also provides evidence for separate biosynthesis of the two moieties of the sucrase-isomaltase complex.

3150 INTESTINAL HEMORRHAGE IN A WOMAN WITH VON RECKLINGHAUSEN'S DISEASE. (Dut.) Knoben, J. M. A. M.; Gossink-Schaafsma, E. H.; Vrints, L. (St. Annaziekenhuis te Geldrop, Netherlands). *Ned. Tijdskr. Geneeskd.* 120(33):409-412; 1976.

3151 SMALL INTESTINAL PERFORATION. (Pol.) Suchodolski, R.; Sereczynska, T.; Preczynska, A. (Z Oddz. Chir. Szpitala im. M. Sklodowskiej-Curie w Zgierzu, Poland). *Wiad. Lek.* 30(16):1259-1263; 1977.

3152 SMALL INTESTINAL MESENTERIC CYST COMPLICATED WITH INFLAMMATION. (Pol.) Orlowski, T.; Badowski, A.; Stanowski, E. (Z I Kliniki Chir. Instytutu Chirurgii Centrum Ksztalcenia Podyplomowego WAM, ul. Szaserow 128, 00-909, Warsaw, Poland). *Wiad. Lek.* 30(16):1297-1300; 1977.

3153 REPORT OF A CASE OF STRANGULATED PROPERITONEAL HERNIA. (Fre.) Milani, H.; Vakili, K.; Vakili, K. A. (Faculty Medicine, Natl. Univ. Iran, Teheran, Iran). *Acta Chir. Belg.* 76(5):515-517; 1977.

3154 HYPERLIPEMIA: POSTOPERATIVE FAT EMBOLISM, WITH PSYCHIATRIC SIGNS, AND PERSISTENT LIPURIA. (Fre.) Leger, L.; Jung, F.; Soprani, A. (Hopital Cochin, 27, rue du Faubourg-Saint-Jacques, 75674 Paris Cedex 14, France). *J. Chir. (Paris)* 114(1/2):3-6; 1977.

3155 HEPATO-BILIARY-PANCREATIC SYSTEM INVOLVEMENT IN SECONDARY DUODENAL STASIS. (Rus.) Bulgakov, G. A. (Acad. Medical Science USSR, Moscow, USSR). *Vestn. Khir.* 119(9):18-21; 1977.

3156 INTESTINAL ADAPTATION. (Eng.) Skagen, D. W.; Schjonsby, H. (Medical Dept. A. Univ. Clinic, Bergen, Norway). *Acta Med. Scand.* (Suppl. 603):29-33; 1977.

3157 PATHOPHYSIOLOGY OF DISEASES INVOLVING INTESTINAL BRUSH-BORDER PROTEINS. (Eng.) Alpers, D. H.; Seetharam, B. (Washington Univ. Sch. Medicine, 660 S. Euclid, St. Louis, MO 63110). *N. Engl. J. Med.* 296(18):1047-1050; 1977.

3158 THE COLON INFLUENCES ILEAL RESECTION DIARRHEA [Abstract]. (Eng.) Mitchell, J.; Zuckerman, L.; Breuer, R. I. (Evanston Hosp., Evanston, IL). *Gastroenterology* 72(5, Part 2): 1103; 1977.

3159 EFFICACY OF LOPERAMIDE IN CONTROL OF DIARRHEA AFTER ILEAL RESECTION (IR) [Abstract]. (Eng.) Gordon, S. J.; Kinsey, M. D.; Kowlessar, O. D. (Jefferson Medical Coll., Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1064; 1977.

3160 SPONTANEOUS EVACUATION OF AN INTESTINAL SEGMENT. (Eng.) Wamsteker, H. (Dept. Surgery, Ziekenhuis St. Antoniushove, Leidschendam, Netherlands). *Arch. Chir. Neerl.* 29(2):149-152; 1977.

3161 SPONTANEOUS EXPULSION OF A MIGRATING INFANTRY MISSILE IMPACTED IN THE DUODENUM AND THE COMMON BILE DUCT, 32 YEARS AFTER WOUNDING. (Eng.) Weithofer, G.; Blazek, Z.; Warm, K.; Bloch, R. (Klinik fur Verdauungs- und Stoffwechselkrankheiten, Am Weinberg 3-5, 6430 Bad Hersfeld, W. Germany). *Endoscopy* 9(2):106-109; 1977.

3162 CONGENITAL JEJUNOILEAL ATRESIA. (Eng.) Viddal, K. O.; Knutrud, O. (Natl. Hosp. Norway, Pilestredet 32, Oslo, Norway). *Z. Kinderchir.* 21(2):148-153; 1977.

3163 SMALL BOWEL INFARCTION SECONDARY TO ABNORMAL FIBRINOLYSIS: A NEW SYNDROME [Abstract]. (Eng.) Davies, R. S.; Glynn, M. F. X.; Jeejeebhoy, K. N. (Toronto General Hosp., Toronto, Canada). *Gastroenterology* 72(5, Part 2):1044; 1977.

3164 MANAGEMENT OF CARCINOID TUMORS OF THE GASTROINTESTINAL TRACT. (Eng.) Welch, J. P.; Malt, R. A. (Massachusetts General Hosp., Boston, MA). *Surg. Gynecol. Obstet.* 145(2):223-227; 1977.

3165 SMALL BOWEL PERFORATION SECONDARY TO METASTATIC CARCINOMA OF THE LUNG. (Eng.) Winchester, D. P.; Merrill, J. R.; Victor, T. A.; Scanlon, E. F. (Evanston Hosp., 2650 Ridge Ave., Evanston, IL 60201). *Cancer* 40(1):410-415; 1977.

3166 RADIOLOGICAL DIAGNOSIS OF POLYP AND CARCINOMA OF THE ILEOCECAL REGION [Abstract]. (Eng.) Funada, A.; Maruyama, M. (Cancer Inst. Hosp., Tokyo, Japan). *Gastroenterol. Jpn.* 12(1): 94; 1977.

See also, 2662, 2672, 2777, 2863, 2865, 2879, 2896, 2898, 2906, 2922, 2923, 2924, 2926, 2951, 2965, 2980, 2981, 2982, 2983, 2996, 3078, 3091, 3116, 3168, 3170, 3187, 3192, 3219, 3220, 3221, 3222, 3227, 3364, 3385, 3403, 3428, 3434, 3438, 3439, 3440, 3448, 3451, 3459, 3463.

SMALL INTESTINE

Malabsorption

3167 TEST MEAL FOR ASSESSING INTRALUMINAL PHASE OF ABSORPTION IN CHILDHOOD. (Eng.) McCollum, J. P. K.; Muller, D. P. R.; Harries, J. T. (Inst. Child Health, 30 Guilford St., London WC1N 1EH, England). *Arch. Dis. Child.* 52(11):887-889; 1977.

A modification of the Lundh test meal for assessing the intraluminal phase of absorption in childhood was validated. The liquified meal is administered by nasogastric tube and contains carbohydrate (4%) in the form of glucose, protein (4%) as comminuted chicken, and fat (4%) as corn oil. One hundred thirty-two test meals were administered to 110 patients aged 2 weeks to 18 yr (mean age 4.3 yr). Ten children with suspected malabsorption, who were proven to be normal after extensive investigation, constituted the control group. The mean trypsin, amylase, lipase, and esterase activities in the controls were 46.4 μEq/min/ml, 34 IU/ml, 860 μEq/min/ml, and 1.6 μmol/min/ml, resp., while the levels in the cystic fibrosis patients were 2.4 μEq/min/ml, 7 μEq/min/ml, and 0.10 μmol/min/ml for trypsin, lipase, and esterase, resp. The total and individual bile salt concentrations for the controls are also presented.

3168 JEJUNAL VILLOUS ATROPHY AND GRANULOMATOUS INFLAMMATION RESPONDING TO A GLUTEN-FREE DIET. (Eng.) Bjorneklett, A.; Fausa, O.; Refsum, S. B.; Torsvik, H.; Sigstad, H. (Rikshospitalet, Arendal, Norway). *Gut* 18(10):814-816; 1977.

The case of a 48-yr-old women with intestinal malabsorption and subtotal to total jejunal villous atrophy, who also had granulomatous inflammation characterized by numerous epitheloid and giant cell granulomas in the stomach, the jejunum, and the liver, is presented. On a gluten-free diet, a complete remission was achieved that included disappearance of the granulomatous inflammation. The granulomas in this case may have been manifestations of the gluten intolerance.

3169 INTESTINAL ABSORPTIVE AND DIGESTIVE FUNCTION IN PERNICIOUS ANEMIA. (Eng.) Arvanitakis, C.; Lyford, C. L.; Folscroft, J. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *Am. J. Med.* 63(6):859-864; 1977.

The digestive and absorptive function of the small intestinal mucosa was examined in three patients with pernicious anemia to determine the functional correlates of the morphologic changes previously described. Digestive brush border enzymes (disaccharidases and leucyl-naphthylamidase) in jejunal biopsy specimens from the patients followed a normal distribution compared with those in 12 healthy volunteers. With the exception of one patient with mild steatorrhea, the rest of the absorption test results (serum carotene, D-xylose urinary excretion, 72-hr fecal fat, serum calcium, serum albumin, jejunal biopsy) were within the normal range. Jejunal perfusion studies, however, with glucose, sodium, and water showed intestinal secretion of sodium and water, i.e., net movement of sodium and water from the plasma to the lumen, in the presence of normal glucose absorption. Follow-up studies in two patients after treatment with vitamin B_{12} did not reveal any significant improvement in the absorption rates from the pretreatment period. This abnormality of sodium and water transport in pernicious anemia represents another intestinal defect of a systemic disease that is not corrected by vitamin B_{12} replacement therapy.

3170 SELECTIVITY OF SMALL INTESTINAL EXUDATE IN CELIAC DISEASE AND CROHN'S DISEASE. (Eng.) Kingham, J. G. C.; Loehry, C. A. (General Hosp., Southampton, SO9 4XY, England). *Am. J. Dig. Dis.* 23(1):33-38; 1978.

The small intestine exudates of three patients with celiac disease and three with proximal jejunal Crohn's disease were compared with three controls, to determine the relationship between increased intestinal permeability (manifesting itself as protein-losing enteropathy) and possible loss of selectivity with the severity of intestinal lesions. The exudates were collected by proximal small intestinal perfusion. Once a steady siphonage was established, 100 Ci ^{125}I-polyvinylpyrrolidone (PVP) was injected i.v. After 1 liter of perfusate was collected, a 10-ml blood sample was taken. Following fractionation into its different molecular weight components, PVP clearance curves for perfusate and plasma were determined. Patients with celiac disease and Crohn's disease showed a significant increase both in permeability and loss of selectivity compared to controls ($p<0.001$), the latter being more profound in celiac disease. It is hypothesized that gross abnormalities in mucosal epithelial cells lead to the increase in permeability and that thickening and functional derangement of the epithelial basement membrane is responsible for the loss of selectivity of the small intestine exudate in celiac disease.

3171 IMMUNOGLOBULINS IN THE JEJUNAL MUCOSA IN ADULT COELIAC DISEASE AND DERMATITIS HERPETIFORMIS AFTER THE REINTRODUCTION OF DIETARY GLUTEN. (Eng.) Lancaster-Smith, M.; Joyce, S.; Kumar, P. (Queen Mary's Hosp., Sidcup, Kent, England). *Gut* 18(11):887-891; 1977.

The changes in jejunal immunoglobulin production after the reintroduction of dietary gluten in treated patients with adult celiac disease (ACD) and dermatitis herpetiformis (DH) was investigated. Cells containing IgA, IgG, and IgM were measured and the distribution of extracellular and epithelial cell immunoglobulin was assessed in nine treated patients with ACD and nine with DH before and after gluten was reintroduced to the diet. Patients with ACD and DH frequently had IgM and IgG cells above the normal range even before re-exposure to gluten, although the range of IgA cells was normal. In both diseases, IgA and IgM cells increased after gluten with a proportionally greater rise in the latter, so that numbers of IgM cells, but not of IgA, exceeded the control range in all but one patient. There were increased quantities of IgA and IgM extracellularly in the lamina propria and in epithelial cells after challenge with gluten. Third component of complement was also found in some biopsies after re-exposure to gluten. These findings support the suggestion that gluten induces a humoral immunological response within the small intestinal mucosa and that both IgA and IgM systems are involved.

3172 MYOPATHY IN WHIPPLE'S DISEASE. (Eng.) Swash, M.; Schwartz, M. S.; Vandenburg, M. J.; Pollock, D. J. (London Hosp., E1 1BB, England). *Gut* 18(10):800-804; 1977.

The case of a patient with Whipple's disease who developed a myopathy that improved during antibiotic therapy is reported. The muscle biopsy showed mild type 2 fiber atrophy, type 1 fiber preponderance, variability in fiber size, and changes in the myofibrillar pattern of affected fibers. Interfascicular macrophages contained PAS-positive material. With the electron microscope these macrophages contained membranous inclusions and bacillary bodies, similar to those seen in the jejunal biopsy. The histological findings in this patient demonstrate the widespread involvement that may occur in the disease, but the precise relation of the myopathy to the inclusions found in the macrophages is uncertain.

3173 PRIMARY MALABSORPTION SYNDROME IN ADULTS. (Ger.) Fric, P. (II. Forschungslaboratorium fur Gastroenterologie, Karls-Universitat, Karlovo nam. 32, 121 11 Prague 2, Czechoslovakia). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(2):59-68; 1976.

3174 EXUDATIVE ENTEROPATHIES. A GENERAL REVIEW. (Fre.) Auzerie, J.; Battin, J. (Hopital des Enfants, 168 Cours de l'Argonne, 33077 Bordeaux Cedex, France). *Med. Infant. (Paris)* 83(5):497-516; 1976.

3175 INFLUENCE OF DIFFERENT MILK PREPARATIONS ON THE FREQUENCY OF DEFECATION. CLINICAL OBSERVATION OF PERSONS WITH DIFFERENT FORMS OF MILK INTOLERANCE. (Ger.) Solc, P.; Kyral, V.; Nova, R.; Jancova, M. (Karlovarska 42, 36013 Karlovy Vary-Dalovice, Czechoslovakia). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(5/6):281-288; 1976.

3176 FOLLOW-UP OF PATIENTS WITH WHIPPLE'S DISEASE. (Ger.) Voellmy, W.; Halter, F.; Keller, M.; Zimmermann, A. (Regionalspital, CH-4900 Langenthal, Switzerland). *Z. Gastroenterol.* 14(7):729; 1976.

3177 PAINFUL AND FEBRILE PSEUDONEOPLASTIC ABDOMINAL SYNDROME: WHIPPLE'S DISEASE. REPORT OF ONE CASE. (Fre.) Chaouat, Y.; Kanovitch, B.; Rakowski, S.; Faures, B.; Benhamou, C.; Bocquet, L. (Service de Rhumatologie, Fondation A. de Rothschild, 29, rue Manin, 75019 Paris, France). *Rev. Rhum. Mal. Osteoartic.* 43(10):575-576; 1976.

3178 RATES OF DIGESTION AND ABSORPTION OF DI- AND MONOSACCHARIDES IN INFANTS WITH MALABSORPTION SYNDROMES [Abstract]. (Eng.) Beyreiss, K.; Hoepffner, W.; Muller, F.; Scheerschmidt, G. (No affiliation given). *Acta Paediatr. Belg.* 29(2): 130-131; 1976.

See also, 2949, 2950, 2997, 2998, 2999, 3135, 3139, 3156, 3215, 3218, 3220, 3224, 3228, 3403, 3408, 3414, 3415, 3416, 3417, 3432, 3440.

LARGE INTESTINE

3179 FECAL MICROBIAL FLORA IN SEVENTH DAY ADVENTIST POPULATIONS AND CONTROL SUBJECTS. (Eng.) Finegold, S. M.; Sutter, V. L.; Sugihara, P. T.; Elder, H. A.; Lehmann, S. M.; Phillips, R. L. (Wadsworth Hosp. Center, Veterans Admin., Los Angeles, CA 90073). *Am. J. Clin. Nutr.* 30(11): 1781-1792; 1977.

Because colon cancer has been associated with high fat and animal protein in the diet and because the incidence of colon cancer in Seventh Day Adventists is known to be 60-70% of that in the general population, fecal flora were studied in 13 vegetarian Seventh Day Adventists and nonvegetarian Adventists. A separate study on fecal *Clostridium paraputrificum* involved a comparison of vegetarian Adventists (45) and non-Adventists on a conventional American diet (31). The Adventist groups had significantly fewer C. *septicum* and C. *tertium* isolates than the non-Adventists. Comparison with earlier diet studies revealed certain striking differences. Fusobacterium and C. *perfringens* counts were very low and lactobacillus counts very high in Adventists as compared with Japanese-Americans on either a Japanese or Western diet or Caucasian individuals on a conventional U.S. diet. Comparison of nonvegetarian Adventists with the other groups on a nonvegetarian Western diet also revealed several statistically significant differences. Finally, there were a number of significant differences in fecal flora when high risk groups (Japanese-Americans on Western Diet and Caucasians on conventional U.S. diet) were compared with low risk groups (Japanese-Americans on a Japanese diet and Adventists).

3180 COLORECTAL COMPLICATIONS OF RENAL ALLOGRAFT TRANSPLANTATION. (Eng.) Sawyerr, O. I.; Garvin, P. J.; Codd, J. E.; Graff, R. J.;

Newton, W. T.; Willman, V. L. (Dept. Surgery, St. Louis Univ., 1325 S. Grand Blvd., St. Louis, MO 63104). *Arch. Surg.* 113(1):84-86; 1978.

The cases of 113 patients with end-stage renal disease who underwent renal transplantation were reviewed to elucidate the incidence of colorectal complications and to determine the clinical course and outcome of these patients. One hundred twenty-five renal transplantations were performed in these patients between January 1968 and December 1975. Six patients had colorectal complications, and five of these patients died as a direct result. Chart analysis of these 113 transplant recipients identified 55 patients as having undergone colonic evaluation (contrast enema, postmortem examination). Seven of these 55 were found to have diverticulosis, and major colonic complications eventually developed in 4. Since the mortality from the complications of colorectal disease in immunosuppressed patients is so prohibitive, consideration should be given to exclusion from transplantation or to elective segmental colectomy prior to transplantation, regarding patients with diverticulosis and a previous history suggestive of diverticulitis.

3181 ADJUVANT LIVER PERFUSION IN COLORECTAL CANCER: INITIAL RESULTS OF A CLINICAL TRIAL.

(Eng.) Taylor, I.; Brooman, P.; Rowling, J. T. (Univ. Dept. Surgery, Liverpool L69 3BX, England). *Br. Med. J.* 2(6098):1320-1322; 1977.

Fifty consecutive patients with colorectal cancer but no evidence of secondary deposits in the liver were included in an ongoing controlled clinical trial of adjuvant liver perfusion with fluorouracil aimed at reducing the incidence of hepatic metastases. All patients underwent resection of the primary tumor. Twenty-six patients served as controls, and 24 received fluorouracil (1 g/day) as a continuous infusion into the portal venous system during the first 7 days after operation. The patients were matched for age, sex, and site and stage of the disease. The immediate postoperative mortality and morbidity did not differ significantly between the two groups. During the follow-up period (mean duration 15.5 months), however, six deaths occurred in the control group and only one in the perfusion group. At necropsy, four of the controls had multiple liver metastases. Two of the surviving controls developed evidence of liver metastases, and two had a local recurrence. No patient in the perfusion group developed evidence of hepatic metastases. These initial results suggest that adjuvant portal venous perfusion with fluorouracil may reduce the incidence of liver metastases in colorectal cancer.

3182 CHEMOTHERAPY AS AN ADJUVANT TO SURGERY FOR COLORECTAL CANCER: A FOLLOW-UP REPORT.

(Eng.) Lawrence, W., Jr.; Terz, J. J.; Horsley, J. S., III; Brown, P. W.; Romero, C. (Medical Coll. Virginia, Box 11, 1200 E. Broad St., Richmond, VA 23298). *Arch. Surg.* 113(2):164-168; 1978.

The results of an adjuvant program of fluorouracil for patients undergoing "curative" resection for adenocarcinoma of the colon and rectum that was initiated as a randomized clinical trial in January 1968 are presented. Patients were randomly assigned to an intraluminal fluorouracil or intraluminal control (saline) group and were so treated at the time of surgical resection, if findings at operation indicated that all gross neoplastic disease could be resected. Those patients receiving intraluminal fluorouracil (30 mg/kg) received i.v. fluorouracil (10 mg/kg) on each of the first 2 postoperative days and five subsequent postoperative courses of p.o. fluorouracil (90 mg/kg) in each 18-day course over a 1-yr period. By July 1, 1975, there were 203 patients undergoing curative resection entered into the study. Survival and disease-free data, as of December 31, 1976, revealed no benefit from this adjuvant course of fluorouracil. These data support the need for continued randomized clinical trials of new and innovative adjuvant therapy compared with an untreated control group.

3183 ENTEROGLUCAGON AND SUBSTANCE P-LIKE IMMUNOREACTIVITY IN ARGENTAFFIN AND ARGYROPHIL RECTAL CARCINOIDS.

(Eng.) Wilander, E.; Portela-Gomes, G.; Grimelius, L.; Lundqvist, G.; Skoog, V. (Univ. Hosp., P.O. Box 553, S-751 22 Uppsala, Sweden). *Virchows Arch.* [*Cell Pathol.*] 25(2):117-124; 1977.

The occurrence of substance P and enteroglucagon immunoreactivity was studied in rectal carcinoid specimens. A specific immunofluorescence for enteroglucagon or substance P or for both hormones was demonstrated in 9 of the 12 examined rectal carcinoids. One tumor was argentaffin, contained ultrastructurally pleomorphic granules of the enterochromaffin cell type, and showed immunofluorescence for substance P. The rest were nonargentaffin but were argyrophil with the Grimelius technique and contained round granules. The argyrophil carcinoids were immunoreactive to one or both hormones in eight cases and not fluorescent in three cases. In two of the nonargentaffin carcinoids, a small number of argyrophil cells was found with the Sevier-Munger method. The fact that substance P immunofluorescence is found in nonargentaffin carcinoids indicates that this substance can be produced in nonargentaffin endocrine cells or that the tumor cells of carcinoids have the potential to differentiate in several directions, with hormone production different from that of normal endocrine cells.

3184 HEREDITARY PROXIMAL COLONIC CANCER.

(Eng.) Lynch, P. M.; Lynch, H. T.; Harris, R. E. (Creighton Univ. Sch. Medicine, 2500 California St., Omaha, NB 68178). *Dis. Colon Rectum* 20(8):661-668; 1977.

Ten families prone to cancer of the colon (in the absence of familial polyposis coli) were investigated to document the site distribution of colonic cancers. A significantly greater frequency of carcinomas of the proximal colon was evident relative to nonfamilial colonic cancers (65% versus less than 35%, p<0.001). Moreover, family members with proximal colonic cancers experienced significantly enhanced survival, compared with family members with distal colonic or rectal cancers (68% versus 38%, p<0.01). Findings consistent with a genetic predisposition included early mean age at onset (45 yr) and a high frequency (40%) of multiple primary cancers in the patients studied. The results are in accord with reported findings in 11 similar kindreds from the literature, and strongly suggest the existence of a heritable variety of colonic cancer in which the proximal colon is at particularly high risk. Extraordinary early diagnostic measures, including colonoscopy, are indicated for members of such families.

3185 NONSPECIFIC PROCTITIS IN ASSOCIATION WITH IRRITABLE COLON SYNDROME. (Eng.)

Tandon, R. K.; Tandon, H. D.; Tandon, B. N. (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi-110016, India). *Am. J. Proctol.* 28(6):29-35; 1977.

Sixty-four patients (male:female ratio=3:1) with nonspecific proctitis associated with irritable colon syndrome were studied. The lesion was limited to 1-2 cm of the terminal rectum, and a clear cut upper border was lacking. The affected mucosa appeared congested, with occasional excoriations or petechiae but was not friable and could not be scraped off. The most common symptoms were tenesmus (93.7%) and rectal urgency (81.2%). Streaking of stool with fresh blood was common (39.1%). No correlation could be made between the different grades of proctoscopic change and the severity or duration of symptoms. Seventeen rectal biopsies were examined histologically. The glands were irregular in their axial distribution, spacing, and size and in the types of cells constituting them. The appearance of the goblet cells suggested regenerative activity following mucosal erosion. There was also severe patchy mucosal edema, congestion and interstitial hemorrhage. There was no cryptitis or crypt abscess, no active mucosal ulceration, and no Paneth cell metaplasia. No known single parasite was detected in any significant number of the patients. The condition responded well to local fomentation, topical anesthetics, and correction of the bowel disturbances. It is likely that the localized, nonspecific inflammatory condition of the anorectal region in these patients may be producing increased colonic motility and thus perpetuating the problem of irritable colon.

3186 HEREDITARY POLYPOSIS COLI I: THE DIAGNOSTIC VALUE OF COLONOSCOPY, BARIUM ENEMA, AND FECAL OCCULT BLOOD. (Eng.)

Pavlides, G. P.; Milligan, F. D.; Clarke, D. N.; Cohen, S. B.; Wennstrom, C. J.; Burbige, E. J.; *et al.* (Johns Hopkins Univ. Sch. Medicine, Baltimore, MD). *Cancer* 40(5, Suppl.): 2632-2639; 1977.

The diagnostic value of colonoscopy, barium enema, and the determination of fecal occult blood in patients at risk for hereditary polyposis coli was assessed in 225 patients from 157 families in whom polyposis had been diagnosed. There were 42 positive colonoscopies and 12 positive barium enemas, with both being positive in 10 subjects. There were 141 negative enemas and 133 negative colonoscopies, with 118 negative for both. Occult blood was positive in 30% of patients with polyposis, which was five to seven times more frequently than in those without evident polyposis. Colonoscopy detected polyposis in 30% of the progeny of affected people. The shortfall, compared with the 50% expected under the Mendelian hypothesis, is readily explained by removal of affected cases from the study by surgery or death from cancer.

3187 DUODENAL LESIONS IN FAMILIAL POLYPOSIS OF THE COLON. (Eng.)

Yao, T.; Iida, M.; Ohsato, K.; Watanabe, H.; Omae, T. (Dept. Internal Medicine II, Kyushu Univ., Maidashi 3-1-1, Higashi-ku, Fukuoka 812, Japan). *Gastroenterology* 73(5): 1086-1092; 1977.

The diagnosis and significance of duodenal lesions in familial polyposis coli were examined by performing hypotonic duodenography, duodenofiberscopy, and endoscopic biopsy in 14 patients with familial polyposis of the colon. In 13 patients, roentgenography or endoscopy revealed adenomas of various size in the duodenum. In the remaining patient, a biopsy specimen that was taken accidentally from the papillary region showed adenoma, although neither duodenography nor endoscopy revealed any abnormality. Adenomas in most cases were multiple and relatively small in size (<5 mm in diameter), and situated in the second portion of the duodenum, whereas a solitary and large adenoma was found in rare cases. This study strongly suggests that the incidence of duodenal lesions might be higher than that previously considered. In many cases, these lesions must have been overlooked, because the conventional technique of duodenography was not sufficient to detect such small adenomas. A high incidence of adenomatous lesions of the stomach or the duodenum and complications of benign or malignant tumors of various organs in familial polyposis of the colon may suggest that this disease is a systemic or generalized disorder rather than the disease of the colon per se. Therefore, the term "familial adenomatosis coli syndrome" seems to be more appropriate than "familial polyposis of the colon."

3188 PSEUDOULCERATIONS OF THE COLON ON BARIUM ENEMA EXAMINATION. (Eng.)

Frank, D. F.; Berk, R. N.; Goldstein, H. M. (Univ. Hosp., 225 W. Dickinson St., San Diego, CA 92103). *Gastrointest. Radiol.* 2(2):129-131; 1977.

Fine spiculations and punctate collections of barium projecting from the contour of the normal colon and simulating the appearance of ulcerations on barium enema examination are described. These may be due either to filling of the crypts of Lieberkuhn with barium or retention of barium in the innominate grooves of the colon. Perhaps both combine to produce the radiographic findings. This normal variant must be carefully distinguished from actual ulcers associated with inflammatory bowel disease to avoid making a major error in diagnosis.

3189 INTESTINAL TUBERCULOSIS: EXPERIENCE AT A CANADIAN TEACHING INSTITUTION. (Eng.) Schulze, K.; Warner, H. A.; Murray, D. (Univ. Iowa Hosp. and Clinics, Iowa City, IA 52242). *Am. J. Med.* 63(5):735-745; 1977.

Thirteen cases of inflammatory bowel disease suspected to be intestinal tuberculosis were analyzed. In nine patients, the diagnosis of tuberculosis was established from such criteria as caseation necrosis, positive acid-fast stains, or cultures of the diseased tissue. In four others, enteric tuberculosis remained a diagnostic possibility as judged by the following criteria: coexistence of the bowel lesion with established tuberculosis elsewhere; a clear response to antituberculous chemotherapy; and typical features on roentgenographic, surgical, or histologic examination. The patients with intestinal tuberculosis were not necessarily recent immigrants (all were either Canadian citizens or had immigrated at least 4 yr prior to developing the disease) or poor (at least 10 were middle-class), nor did they have coexistent active pulmonary disease. Although most exhibited classic features of intestinal tuberculosis, the diagnosis was rarely considered at first. A greater awareness of the entity is needed to avoid confusion between intestinal tuberculosis and Crohn's disease.

3190 OLEOGRANULOMA OF THE RECTUM PRODUCED BY LASONIL OINTMENT. (Eng.) Greaney, M. G.; Jackson, P. R. (Royal Infirmary, Sheffield S6 3DA, England). *Br. Med. J.* 2(6093):997-998; 1977.

3191 THE RESULTS OF TREATMENT FOR COMPLETE PROLAPSE OF THE RECTUM IN THE ADULT PATIENT. (Eng.) Moore, H. D. (4 Magdalen Rd., Exeter EX2 4LY, England). *Dis. Colon Rectum* 20(7):566-569; 1977.

3192 VOLVULUS OF THE TRANSVERSE COLON: A POSTOPERATIVE COMPLICATION OF TRUNCAL VAGOTOMY AND GASTROJEJUNOSTOMY. (Eng.) Sormann, G. W.; Hardy, K. J. (Repatriation General Hosp., Heidelberg, Victoria 3077, Australia). *Aust. N.Z. J. Surg.* 46(3):249-251; 1976.

3193 TROPICAL INTUSSUSCEPTION IN ADULTS. (Eng.) Rasaretnam, R.; Kumarakulasinghe, C. B.; Eaton, H. L. (Colombo General Hosp., Colombo, Sri Lanka). *Aust. N.Z. J. Surg.* 46(1):57-63; 1976.

3194 CONTROLLED STUDY OF ORAL ADMINISTRATION OF ANTIBIOTICS IN THE PREPARATION OF DIGESTIVE SURGERY. (Fre.) Mendes da Costa, P.; Klastersky, J.; Gerard, A. (Institut Jules Bordet, Rue Heger-Bordet 1-3, B-1000 Bruxelles, Belgium). *Acta Chir. Belg.* 76(5):475-480; 1977.

3195 GRAFTS FOR ANAL SURGERY. (Fre.) Vigoni, M. (Avenue Louise 349, B-1050 Bruxelles, Belgium). *Acta Chir. Belg.* 76(5):481-487; 1977.

3196 LONGITUDINAL MYOTOMY OF THE SIGMOID. (Ita.) Polto, F.; Fusto, A.; Donati, A.; Morici, V.; Occhiato, V. (Istituto di Anatomia Chirurgica e Corso di Operazioni, Universita di Catania, Catania, Italy). *Chir. Patol. Sper.* 24(5):412-432; 1976.

3197 GARDNER'S SYNDROME: CLINICAL, RADIOLOGICAL AND ENDOSCOPIC STUDY OF ONE CASE. (Por.) Pupo Neto, J. C.; Soares da Silva, A.; Azulay, R. D.; Abrahao, L. J. (Dep. de Medicina Clinica da Universidade Federal Fluminense, Brazil). *An. Bras. Dermatol.* 52(2):217-226; 1977.

3198 2. ANAL FISSURES. (Fre.) Poisson, J. (Centre Hospitalier Universitaire, Universite de Sherbrooke, Sherbrooke, Quebec J1H 5N4, Canada). *Can. J. Surg.* 20(5):417-421; 1977.

3199 DISORDERS OF THE CREATINE KINASE REACTION IN THE MUCOUS MEMBRANE OF THE LARGE INTESTINE IN PATIENTS WITH CHRONIC ENTEROCOLITIS. (Rus.) Shamov, I. A.; Veksler, Ya. I.; Aslanova, N. R. (Dagestan Medical Inst., Dagestan, USSR). *Vrach. Delo* (8):89-91; 1977.

3200 THE DILEMMA OF PRESERVATION OF THE RECTUM: DISCUSSION. (Eng.) Remington; Khubchandani; Schrock; Nemer. (No affiliation given). *Dis. Colon Rectum* 20(8):655-660; 1977.

3201 MULTIPLE INTESTINAL INCARCERATIONS IN INGUINAL HERNIA AS A CAUSE OF INFLAMMATORY SIGMOID TUMORS. (Pol.) Pisarski, A.; Starzewski, J.; Rudkowski, A. (I. Klinika Chirurgii Ogolnej Inst. Chirurgii Slaskiej AM, ul. Francuska 20/24, 40-027 Katowice, Poland). *Wiad. Lek.* 30(16):1293-1295; 1977.

3202 A CASE OF FAMILIAL COLONIC POLYPOSIS ASSOCIATED WITH ABNORMALITIES OF THE EXTRA GASTROINTESTINAL TRACT. (Jpn.) Okamoto, M.; Nakanishi, M.; Toda, K.; Yamanaka, T. (Okayama City Hosp., Okayama, Japan). *Jpn. J. Cancer Clin.* 23(11): 1108-1111; 1977.

3203 PATHOGENESIS OF ABDOMINAL ACTINOMYCOSIS. (Rus.) Moskovskaya, M. A. (Clinical Div., E. I. Martsinov Inst. Medical Parasitology and Tropical Medicine, Moscow, USSR). *Vestn. Khir.* 119(10):63-67; 1977.

3204 DIAGNOSTIC ERRORS IN ACUTE APPENDICITIS IN WOMEN DUE TO ANATOMO-PHYSIOLOGICAL PECULIARITIS OF THE ORGAN. (Rus.) Podonenko-Bogdanova, A. P. (Second Clinical Surgery Div., Donetsk Medical Inst., Donetsk, USSR). *Vestn. Khir.* 119(10):138-141; 1977.

3205 COLONIC AND RECTAL CHEMICAL BURNS. (Rus.) Oskretkov, V. I.; Sudorgin, V. E.; Dudchenko, V. M. (Dept. Clinical Surgery, Altai Medical Inst., USSR). *Vestn. Khir.* 119(10):125-127; 1977.

See also, 2662, 2895, 2904, 2905, 2906, 2924, 2933, 3943, 2952, 2953, 2954, 2974, 2978, 2979, 2982, 3000, 3002, 3042, 3116, 3153, 3158, 3164, 3408, 3409, 3439, 3448, 3451, 3453, 3455, 3460, 3465.

LARGE INTESTINE

Ulcerative Colitis

3206 LEUCOCYTE MIGRATION TEST WITH AUTOLOGOUS COLONIC MUCOSA AS ANTIGEN IN PATIENTS WITH ULCERATIVE COLITIS. (Eng.) Astrup, L.; Rasmussen, S. N.; Binder, V. (Frederiksberg Hosp., Ndr. Fasanvej 59, 2000 Copenhagen F, Denmark). *Scand. J. Gastroenterol.* 12(6):765-768; 1977.

Studies were carried out to evaluate the immunological parameters of ulcerative colitis by examining the patients' own colonic mucosa as a possible antigen and to determine whether a possible autohypersensitivity is specific to colonic mucosa. The leukocyte migration agarose technique (LMAT) was applied in a study of the migration of peripheral WBC in 16 patients with ulcerative colitis using three different autologous types of tissue as antigen: rectal, skin, and buccal mucosa. In all cases, the migration indices were within normal limits, and they did not differ from those in 12 controls with peptic ulcer, irritable colon, or hemorrhoidal tumors. The results do not support the theory of cellular hypersensitivity against colonic mucosa in patients with ulcerative colitis.

3207 SURGICAL MANAGEMENT OF TOXIC MEGACOLON. (Eng.) Roys, G.; Kaplan, M. S.; Juler, G. L. (Veterans Admin. Hosp., 5901 E. Seventh St., Long Beach, CA 90822). *Am. J. Gastroenterol.* 68(2):161-163; 1977.

Experience over the past 11 yr with 10 patients with chronic ulcerative colitis in whom toxic megacolon developed is presented. The patients were among a total of 220 patients admitted for chronic ulcerative colitis. Only 3 of the 10 patients had previously been treated with steroids. Steroid therapy reversed the acute process in three patients. All three patients later came to surgery. Toxic megacolon developed during the first episode of ulcerative colitis in 7 of the 10 patients. Three of the seven had colonic perforation prior to operation. Two patients died after a subtotal colectomy, and one died without operation. A delayed diagnosis was associated with sepsis in five patients and with all three deaths. Seven patients survived proctocolectomy. Prolonged medical management without a dramatic response appeared to correlate with a high postoperative morbidity. This study supports the concept of aggressive diagnosis and early surgical intervention for toxic megacolon.

3208 MUCOSAL SURFACE MORPHOLOLOGY IN ULCERATIVE COLITIS [Abstract]. (Eng.) Poulsen, S. S. (Anatomy Dept., Univ. Copenhagen, 63, Norre Alle, DK-2100 Copenhagen O, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):73; 1977.

3209 THE CARBOHYDRATE CONTENT OF ULCERATIVE COLITIS MUCUS [Abstract]. (Eng.) Teague, R. (Dept. Medicine, Univ. Bristol, Bristol BS8 1TD, England). *Adv. Exp. Med. Biol.* 89:511; 1977.

3210 RADIOLOGY IN THE CURRENT ASSESSMENT OF ULCERATIVE COLITIS. (Eng.) Bartram, C. I. (St. Mark's Hosp., City Rd., London EC1, England). *Gastrointest. Radiol.* 1(4):383-392; 1977.

3211 INCREASED SERUM BINDING TO SYNTHETIC RNA IN INFLAMMATORY BOWEL DISEASE (IBD) [Abstract]. (Eng.) DeHoratius, R. J.; Miller, W. C.; Volpicelli, N. A.; Harding, J. W.; Strickland, R. G. (Univ. New Mexico Sch. Medicine, Albuquerque, NM). *Gastroenterology* 72(5, Part 2):1047; 1977.

See also, 2903, 2950, 2982, 3000, 3460, 3464, 3466.

3212 BILE, PANCREATIC CANCER, AND THE ACTIVATION OF PANCREATIC JUICE. (Eng.) Allan, B. M.; White, T. T. (Dept. Surgery, RF 25, Univ. Washington, Seattle, WA 98195). *Biochem. Biophys. Res. Commun.* 79(2):485-492; 1977.

Mechanisms involved in the activation of pancreatic juice following mixing with bile were investigated using pancreatic juice collected postoperatively from five patients and hepatic bile from two patients. Pancreatic juice specimens mixed with one of the bile samples (1:1) became activated at varying rates when incubated at 37 C. When the pancreatic juice specimens were mixed with the other bile sample, no active trypsin was found after 96 hr of incubation of 37 C. The bile that prevented activation had a high trypsin inhibitory capacity. Lower amounts of pancreatic secretory trypsin inhibitor (PSTI) were present in the samples of pancreatic juice that activated faster with the first bile sample tested. The data also suggest that increased amounts of trypsin-PSTI complex were present in the samples of pancreatic juice that activated faster. Thus, activation in the presence of bile depends on both the individual specimens and the proportions of bile and pancreatic juice used. When calcium was added to the incubation mixture, pancreatic secretions activated in a similar order as with the trypsin inhibitor-free bile. It is proposed that bile can only activate pancreatic juice following a trigger event of sufficient magnitude, such as carcinoma, to introduce trypsin or trypsin-like enzymes (i.e., plasmin) into pancreatic secretions, resulting in the formation of large amounts of the trypsin-PSTI complex.

3213 SERUM ALPHAFETOPROTEIN IN CYSTIC FIBROSIS OF THE PANCREAS. (Eng.) Brock, D. J. H.; Barron, L.; Manson, J.; McCrae, W. M. (Western General Hosp., Edinburgh EH4 2XU, Scotland). *Clin. Chim. Acta* 82(1/2):101-103; 1978.

Serum α-fetoprotein (AFP) concentrations were measured by three different types of radioimmunoassay in 30 patients with cystic fibrosis of the pancreas and in 55 controls to investigate the usefulness of AFP in the diagnosis and heterozygote detection in cystic fibrosis. The highest value obtained in a cystic patient was 10.2 ng/ml and in a control 10.8 ng/ml. These are within published normal limits. Previously reported large increases in serum AFP in patients with cystic fibrosis and in heterozygote carriers were not confirmed.

3214 A CLINICAL EVALUATION OF ISOTOPE SCANNING, ULTRASONOGRAPHY AND COMPUTED TOMOGRAPHY IN PANCREATIC DISEASE [Abstract]. (Eng.) Braganza, J. M.; Fawcett, R. A.; Isherwood, I.; Russell, J. C. B.; Testa, H. J.; Torrance, H. B.; Howat, H. T. (Dept. Diagnostic Radiology, Univ. Manchester, Manchester, England). *Ir. J. Med. Sci.* 146(Suppl. 1):27-28; 1977.

3215 PP IN THE DIAGNOSIS OF PANCREATIC INSUFFICIENCY [Abstract]. (Eng.) Bloom, S. R.; Besterman, H. S.; Adrian, T. E.; Mallinson, C. N. (Hammersmith Hosp., London, England). *Ir. J. Med. Sci.* 146(Suppl. 1):13; 1977.

3216 SECRETORY ABNORMALITIES IN PANCREATIC CANCER [Abstract]. (Eng.) Reber, H. A.; Johnson, F. E.; Roberts, C.; Montgomery, C. (Veterans Admin. Hosp., San Francisco, CA). *Ir. J. Med. Sci.* 146(Suppl. 1):9; 1977.

3217 PATHOLOGICAL STUDIES ON THE PATHOGENESIS OF THE ALCOHOLIC LESIONS OF THE PANCREAS [Abstract]. (Eng.) Kojima, K. (Center Pathology, Kooseiren, Niigata Prefecture, Japan). *Gastroenterol. Jpn.* 12(4):340-341; 1977.

3218 A NEW METHOD TO STUDY THE CHYMOTRYPTIC ACTIVITY OF THE INTESTINAL MUCOSA BY N-BENZOYL-L-TYROSYL-PABA, AND ITS EVALUATION IN NORMALS AND IN PANCREATIC PATIENTS [Abstract]. (Eng.) Lami, F.; Bonetti, C.; Toni, A.; Miglioli, M.; Barbara, L. (Policlinico S. Orsola, Bologna, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):88; 1977.

3219 PLASMA IMMUNOREACTIVE SECRETIN RESPONSE TO ACIDIFICATION IN PANCREATECTOMIZED PATIENTS [Abstract]. (Eng.) Hanssen, L. E.; Karesen, R.; Aune, S. (Ulleval Hosp., Oslo, Norway) *Ir. J. Med. Sci.* 146(Suppl. 1):31; 1977.

3220 THE ORAL PANCREATIC FUNCTION TEST (PFT) IN PANCREATIC AND GASTROINTESTINAL DISEASE [Abstract]. (Eng.) Mitchell, C. J.; Humphrey, C. S.; Kelleher, J.; Bullen, A. W. (St. James' Univ. Hosp., Leeds LSD 7TF, England). *Ir. J. Med. Sci.* 146(Suppl. 1):31-32; 1977.

3221 PERIAMPULLARY CANCER: CLINICAL INTRODUCTION. (Eng.) Read, A. E. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 90-94; 1977.

3222 ECTOPIC PANCREAS OF THE AMPULLA OF VATER. (Eng.) Vankemmel, M.; Houcke, M. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 153-155; 1977.

3223 CHRONIC ALCOHOLISM AND HUMAN PANCREATIC SECRETION [Abstract]. (Eng.) Palasciano G.; Sarles, H. (INSERM, U-31, 46 chemin de la Gaye, 13009, Marseille, France). *Ir. J. Med. Sci.* 146 (Suppl. 1):34; 1977.

3224 MEASUREMENT OF PROTEIN DIGESTION BY THE GASTROINTESTINAL TRACT IN MAN USING THE ORAL LAVAGE METHOD [Abstract]. (Eng.) Love, A. H. G. (Dept. Medicine, Queen's Univ. Belfast, Belfast, Northern Ireland). *Ir. J. Med. Sci.* 146(Suppl. 1): 18-19: 1977.

3225 HEMORRHAGE IN PANCREATIC PSEUDOCYST PRESENTING AS MASSIVE GASTROINTESTINAL BLEEDING: REPORT OF A CASE. (Eng.) Stenberg, B.; Lukes, P.; Nilsson, A. E.; Darle, N. (Sahlgren's Hosp., Goteburg, Sweden). *Acta Chir. Scand.* 143(4): 249-251; 1977.

3226 PATTERN OF PANCREATIC CARCINOMA BY REAL-TIME AND GRAY-SCALE ULTRASONOGRAPHY. (Eng.) Hassani, S. N.; Smulewicz, J. J.; Bard, R. (Dept. Radiology, State Univ. New York, Stony Brook, NY). *Appl. Radiol.* 6(5):150-152, 158-159; 1977.

3227 PANCREATICODUODENAL ARTERY ANEURYSM SIMULATING CARCINOMA OF THE HEAD OF THE PANCREAS. (Eng.) Scheflan, M.; Kadir, S.; Athanasoulis, C. A.; Hedberg, S. E. (Massachusetts General Hosp., Fruit St., Boston, MA 02114). *Arch. Surg.* 112(10):1201-1203; 1977.

See also, 2769, 2948, 2982, 2986, 3008, 3009, 3010, 3155, 3228, 3231, 3236, 3353, 3401, 3411, 3426, 3445.

PANCREAS

Pancreatitis

3228 RATIONALE FOR THE USE OF CIMETIDINE IN PANCREATIC INSUFFICIENCY. (Eng.) Regan, P. T.; Malagelada, J. R.; Dimagno, E. P.; Go, V. L. W. (Mayo Clinic, Rochester, MN). *Mayo Clin. Proc.* 53(2):79-83; 1978.

The use of an H_2-receptor antagonist cimetidine in conjunction with standard p.o. pancreatic enzyme replacement therapy to induce greater transgastric passage of ingested enzymes, resulting in improved intraluminal lipolysis, was tested in patients with advanced pancreatic insufficiency. The effects of p.o.-administered cimetidine were studied in two groups of patients using a double-marker perfusion technique. Cimetidine (200-400 mg/day) had no effect on postprandial exocrine pancreatic function in 16 duodenal ulcer patients without pancreatic disease. In six patients with pancreatic insufficiency, cimetidine produced a pronounced decrease in the output of gastric acid (-63.4%, $p<0.05$ in comparison with controls) and secretory volume (-44.9%, $p<0.05$), resulting in reduction of postprandial acidity and intragastric volume. These actions of cimetidine should retard or prevent inactivation of ingested enzymes and also increase their intragastric concentration, with resulting enhancement of luminal duodenal enzyme activity. Supplemental cimetidine may thus be useful in the medical management of patients who fail to respond to routine pancreatic extract therapy alone.

3229 SERUM PHOSPHOLIPASE A IN PATIENTS WITH ACUTE PANCREATITIS. (Eng.) Hashihira, S.; Nishii, T.; Takeda, Y.; Mori, R.; Wakabayashi, A. (Osaka Medical Coll., Takatsuki, Osaka, Japan). *Jpn. Arch. Intern. Med.* 24(7):243-249; 1977.

To examine the relationship between serum phospholipase A (PLA) and serum amylase levels and the clinical symptoms of acute pancreatitis, serum PLA and amylase activities were measured in 285 patients and one hundred normal controls. The test population consisted of patients with acute pancreatitis (11), chronic pancreatitis (30), cancer of the pancreas (10), other cancers (11), hepatic diseases (30), biliary diseases (20), peptic ulcer (15), pulmonary diseases (12), renal diseases (20), diabetes mellitus (19), and mumps (7). A normal distribution of serum PLA (6.8 ± 2.1 U/ml) and of serum amylase (131 ± 31 U) was observed in the controls so that the normal ranges were thus considered to be 2.6-11.0 U/ml and 69-193 U, resp., and ≥ 12 U/ml and ≥ 200 U were considered elevations of PLA and amylase, resp. Serum PLA levels were significantly elevated ($p<0.001$) in patients with acute pancreatitis, chronic pancreatitis, pancreatic cancer, and biliary disease (50.1 ± 23.0, 29.8 ± 37.5, 13.2 ± 5.6, and 16.2 ± 8.6 U/ml, resp.). Serum amylase levels were significantly elevated ($p<0.001$) in patients with acute pancreatitis, chronic pancreatitis, pancreatic calcification, biliary disease, peptic ulcer, renal disease, and mumps (906 ± 522, 241 ± 140, 97 ± 33, 201 ± 70, 161 ± 58, 222 ± 73, and 723 ± 294 U). In patients with acute pancreatitis, amylase levels returned to normal 5-6 days after onset, while PLA levels tended to lag behind recovery 4-5 days, showing a closer correlation with the change in symptoms than did amylase levels. Serum PLA determinations may be significant in the diagnosis of acute pancreatitis and as a pathophysiological index.

3230 INHERITED DEFECT IN HEREDITARY PANCREATITIS. (Eng.) Malik, S. A.; Van Kley, H.;

Knight, W. A., Jr. (St. Mary's Health Center, 6420 Clayton Rd., St. Louis, MO 63117). *Am. J. Dig. Dis.* 22(11):999-1004; 1977.

A new kindred with three definite and six suspected cases of hereditary pancreatitis (HP) was investigated for possible inherited abnormalities. No aminoaciduria (except for a slight rise in urinary histidine in 1 patient) and no hyperparathyroidism, hyperlipidemia, or chromosomal abnormality was present. An increase in the serum IgM level of a polyclonal type was noted in three definitely affected sisters and also in two nonaffected family members. Serum alpha-1-antitrypsin and serum trypsin inhibition were normal. However, very marked dilatation and ectasia of the pancreatic duct were found in the propositus. Reviewing the data from this family and previously described kindreds, it is postulated that the genetic abnormality in HP encompasses a wide variety of structural and anatomical defects in the sphincter of Oddi or the pancreatic ductal system. These predispose to intermittent obstruction of the duct with concomitant activation of enzymes and ductal metaplasia. In suspected cases, an early effort should be made to outline the pancreatic duct, as the defect may be amenable to surgery.

3231 DETECTION OF BACTERIAL INFECTION OF THE PANCREATIC DUCTS IN PATIENTS WITH PANCREATITIS AND PANCREATIC CANCER DURING ENDOSCOPIC CANNULATION OF THE PANCREATIC DUCT.

(Eng.) Gregg, J. A. (110 Francis St., Boston, MA 02215). *Gastroenterology* 73(5):1005-1007; 1977.

Studies were carried out in 35 patients with pancreatitis, 5 patients with pancreatic cancer, and 25 controls to determine whether bacterial infection of the pancreas occurs during nonsuppurative pancreatitis. During endoscopic cannulation of the main pancreatic duct, secretin was administered i.v., and pancreatic juice aspirated from within the duct was cultured. Bacterial infections were detected in 11 patients with pancreatitis and 3 with pancreatic cancer. The pancreatic juice was sterile in the controls. Cultures from the common bile duct in nine controls were also sterile, whereas four of six with pancreatitis showed infected bile. The infecting organisms were principally gram-negative, and the infections were usually polymicrobial. Antibiotics, where used, successfully eradicated the infecting organisms but did not appear to affect the patient's clinical course.

3232 SERUM AMYLASE ISOZYMES IN PATIENTS WITH CHRONIC PANCREATITIS WITH HYPERAMYLASEMIA.

(Eng.) Wakabayashi, A.; Saeki, M.; Mori, R.; Oshiba, S. (Second Dept. Medicine, Osaka Medical Coll., 2-7, Daigaku-cho, Takatsuki, 569 Japan). *Gastroenterol. Jpn.* 12(4):269-274; 1977.

Serum amylase isozymes were determined in 39 patients with chronic pancreatitis, including 13 with alcoholic pancreatitis, and in 23 healthy control subjects to clarify the relationship between hyperamylasemia and clinical states in chronic pancreatitis. The serum pancreatic type isoamylase (P-amylase) levels were 359 ± 109 IU/l in 7 patients with chronic pancreatitis in a state of acute exacerbation and 80 ± 43 IU/l in 32 patients with chronic pancreatitis in remission compared with a control value of 127 ± 19 IU/l. In all 39 patients, the serum P-amylase activity showed a positive correlation with the amylase secreting capacity of the pancreas. The serum-salivary type isoamylase (S-amylase) activity was higher in the acute exacerbation group (223 ± 120 IU/l) than in controls (123 ± 26 IU/l), but it was the same as the control value in the remission group (142 ± 66 IU/l) except for some cases that showed higher values. There were 10 patients who displayed hyperamylasemia, which was apparently due to the acute exacerbation in 7 cases. The serum P-amylase activity was high in all patients with acute exacerbation (range, 196-553 IU/l), and the serum S-amylase was also high in three of these patients (228, 256, and 475 IU/l, resp.). In three patients who had alcoholic pancreatitis and displayed hyperamylasemia without acute exacerbation, the P-amylase was low (14, 26, and 27 IU/l, resp.), and the S-amylase activity was markedly elevated (314, 324, and 351 IU/l, resp.). The ratio of amylase clearance to creatinine clearance was measured in 15 of the patients, and the values were within normal limits in all of the patients (1.48-4.20%). It is emphasized that hyperamylasemia in chronic pancreatitis may be caused by high S-amylase activity in addition to high P-amylase activity, especially in alcoholic pancreatitis.

3233 PRIMARY CHRONIC PANCREATITIS. A CLASSIFICATION BASED ON ENDOSCOPIC PANCREATOGRAPHY.

(Fre.) Cremer, M.; Toussaint, J.; Hermanus, A.; Deltenre, M.; De Toeuf, J.; Engelholm, L.; *et al.* (Rue de la Reforme 60, B-1060 Brussels, Belgium). *Acta Gastroentrol. Belg.* 39(11/12):522-546; 1976.

3234 POSSIBILITIES AND LIMITATIONS OF THE CLASSIC RADIOLOGICAL EXAMINATION IN THE DIAGNOSIS OF PRIMARY CHRONIC PANCREATITIS.

(Fre.) Engelholm, L.; De Toeuf, J.; Hermanus, A.; Struyven, J.; Cremer, M.; Deltenre, M.; *et al.* (Institut J. Bordet, Rue Heger Bordet 3, B-1000 Brussels, Belgium). *Acta Gastroenterol. Belg.* 39(11/12): 405-425; 1976.

3235 RADIOLOGICAL POSSIBILITIES IN THE DIAGNOSIS OF CHRONIC PANCREATITIS.

(Ita.) Pistolesi, G. F. (Policlinico Borgo Roma, Verona, Italy). *Minerva Med.* 68(30):2085-2086; 1977.

3236 DIAGNOSIS OF CHRONIC PANCREATITIS WITH PANCREATIC DUCT OBSTRUCTION.

(Rus.) Shalimov, S. A.; Shkarban, P. E.; Bogomolova, T. N.; Shpontak, A. S. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (4):21-25; 1977.

3237 SIGNIFICANCE OF CLINICAL METHODS IN THE DIAGNOSIS OF PANCREATITIS IN CHILDREN. (Rus.) Gudzenko, Z. P. (Second Dept. Pediatrics, Kiev Inst. Advanced Medical Studies, Kiev, USSR). *Vopr. Okhr. Materin. Det.* 22(2):38-42; 1977.

3238 SIGNIFICANCE OF AMYLASE CLEARANCE RELATIVE TO CREATININE CLEARANCE. ITS DIAGNOSTIC VALUE IN ACUTE PANCREATITIS: REPORT OF 191 CASES. (Fre.) Hostein, J.; Fournet, J.; Bonnet-Eymard, J. (CHU de Grenoble, 38700 La Tronche, France). *Gastroenterol. Clin. Biol.* 1(4):405; 1977.

3239 DIAGNOSIS AND TREATMENT OF ACUTE PANCREATITIS. (Rus.) Matyashin, I. M.; Voitenko, A. A.; Zaverny, L. G.; Malinovsky, Yu. F. (Surgical Clinic, Kiev Medical Inst., Kiev, USSR). *Khirurgiia (Mosk.)* (3):67-71; 1977.

3240 COMPLEX THERAPY OF ACUTE PANCREATITIS. (Rus.) Babris, I. V. (Clinic General Surgery, Riga Medical Inst., Riga, USSR). *Khirurgiia (Mosk.)* (3):77-79; 1977.

3241 CHANGES IN THE TREATMENT OF ACUTE PANCREATIC NECROSIS. (Ger.) Hollender, L. F. (III. Chirurgische Universitats-Klinik, Strasburg, France). *Fortschr. Med.* 95(15):1029-1031; 1977.

3242 TREATMENT OF ACUTE PANCREATITIS. (Ger.) Muller-Wieland, K. (I. Medizinische Universitatsklinik, Martinistr. 52, 2000 Hamburg 20, W. Germany). *Dtsch. Med. Wochenschr.* 101(47): 1729-1731; 1976.

3243 LABORATORY INFORMATION AND SOME PROBLEMS OF INTENSIVE THERAPY OF PATIENTS WITH ACUTE PANCREATITIS. (Rus.) Lashchevker, V. M. (Second Dept. Surgery, Odessa Medical Inst., Odessa, USSR). *Klin. Khir.* (4):13-17; 1977.

3244 INTRAGASTRIC HYPOTHERMIA FOR ACUTE PANCREATITIS IN CHILDREN. (Rus.) Ankudinov, F. S.; Savostin, A. I. (Yuzhno-Sakhalinsk Municipal Hosp., Yuzhno-Sakhalinsk, USSR). *Khirurgiia (Mosk.)* (3):83-85; 1977.

3245 ROLE OF HYPOTHERMIA IN COMPLEX THERAPY OF ACUTE PANCREATITIS. (Rus.) Kotelnikov, V. P.; Pankov, V. I.; Biryukov, V. I. (Surgical Clinic, Ryazan Medical Inst., Ryazan, USSR). *Khirurgiia (Mosk.)* (3):74-77; 1977.

3246 PRELIMINARY EXPERIENCE WITH GLUCAGON TREATMENT IN ACUTE NECROTIC PANCREATITIS. (Ger.) Wagner, I.; Wilke, E.; Dietze, F. (Medizinische Klinik des Stadtischen Krankenhauses Berlin-Kopenick, Salvador-Allende-Str. 2-8, 117 Berlin, E. Germany). *Dtsch. Gesundheitsw.* 31 (39):1861-1863; 1976.

3247 PROBLEMS OF DIETARY PROPHYLAXIS AND THERAPY OF CHRONIC PANCREATITIS. (Ita.) Finzi, M. (Universita di Bologna, Galleria del Leone 2, Bologna, Italy). *Minerva Med.* 68(30): 2093-2102; 1977.

3248 CLINICAL STUDY OF CONSERVATIVE COMBINATION THERAPY FOR ACUTE PANCREATITIS. (Ger.) Moser, H. (III. Chirurgischen Abteilung des Allgemeinen Krankenhauses Graz, Grillparzerstrasse 2, A-8010 Graz, Austria). *Wien. Med. Wochenschr.* 127(14):457-458; 1977.

3249 PROPOSAL FOR THE NOSOLOGICAL CLASSIFICATION OF ACUTE PANCREATITIS FOR THE CORRECT COMPARATIVE ASSESSMENT OF THE THERAPEUTIC EFFICACY OF DRUGS. (Ita.) Di Macco, G.; Pappalardo, G. (II. Clinica Chirurgica, Universita degli Studi di Roma, Roma, Italy). *Ann. Ital. Chir.* 48(2):209-214; 1976.

3250 PRINCIPAL CRITERIA OF DRUG TREATMENT OF CHRONIC PANCREATITIS. (Ita.) Fontana, G.; Gullo, L.; Ventrucci, M.; Costa, P. L.; Caletti, G. C.; Bolondi, L.; Ripani, R. (Istituto di Clinica Medica I, Universita degli Studi di Bologna, Bologna, Italy). *Minerva Med.* 68(30):2103-2108; 1977.

3251 EFFECT OF A BENZOPYRENE PREPARATION IN ACUTE HEMORRHAGIC NECROTIZING PANCREATITIS DURING SURGICAL THERAPY. (Ger.) Vida, S. (Evangelisches Krankenhaus, 5070 Bergisch-Gladbach, W. Germany). *Therapiewoche* 27(30):5476-5483; 1977.

See also, 2751, 2752, 2775, 2950, 2978, 3010, 3214, 3217, 3220, 3225, 3353, 3402, 3411, 3425, 3436.

3252 IMMUNOLOGICAL CHANGES IN LIVER DISEASE. (Eng.) Sherlock, S. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Proc. R. Soc. Med.* 70(12):851-855; 1977.

Immunological changes in liver disease are reviewed. They may be induced either by liver damage, irrespective of the cause, or by specific factors present in any particular liver disease. The hypergammaglobulinemia observed in most cases of liver disease is probably caused by the failure of the damaged liver to clear antigens. The depressed cell-mediated (T-cell) immunity in chronic liver disease probably releases inhibition of B lymphocytes as a consequence of lack of suppressive T cells. In chronic active hepatitis, immunological changes are associated with a persistance of hepatitis B surface antigen (HBsAg) in the serum or with a negative HBsAg test. The following mechanisms of liver injury are presented: (1) direct action of complement fixing antibodies on the liver cell membrane, (2) formation of local immune complexes fixing complement, (3) T-cell mediated cytotoxity, and (4) antibody-dependent cellular cytotoxity. The latter mechanism seems to be the most important. Mechanisms of bile duct destruction in primary biliary cirrhosis are unclear. Smooth muscle antibody (SMA) is detected in high titers in two-thirds of patients with HBsAg-negative chronic active hepatitis (CAH). It is much less frequent and present in low titers in those with HBsAg-positive CAH. SMA can be found in low titers in 80% of patients with type A or B hepatitis. Mitochondrial antibodies occur in serum of 90% of patients with primary biliary cirrhosis, being a very important diagnostic test. Relatives of patients with either HBsAg-negative CAH or primary biliary cirrhosis show an increased incidence of antinuclear antibodies and SMA. In cryptogenic cirrhosis and CAH, an increased incidence of histocompatibility antigens HLA 1 and HLA 8 is observed. Autoantibodies against liver cell membranes were demonstrated in HBsAg-negative CAH and in cryptogenic cirrhosis.

3253 ALTERATIONS OF THE RESPIRATORY FUNCTION DURING HEPATOPATHIES WITH IMMUNE INVOLVEMENT. (Fre.) Nouvet, G.; Le Loet, C.; Pasquis, P.; Colin, R.; Bourreille, J.; Hemet, J.; *et al.* (Hopital Charles-Nicolle, 1, rue de Germont, 76038 Rouen Cedex, France). *Poumon Coeur* 33(3):175-182; 1977.

Respiratory function tests were performed in 24 patients with histologically confirmed chronic hepatitis. According to De Groote's classification, 13 patients had chronic aggressive hepatitis, 9 had chronic persisting hepatitis, and 2 had active posthepatic cirrhosis. The respiratory function was found to be normal in 2 patients only; 14 patients were found to have reduced alveolocapillary transfer capability, and 8 others had hyperinflation syndrome. The reduction of the alveolocapillary transfer may be due to diffuse interstitial pulmonary lesions that are observed in some cases of chronic hepatitis. This interstitial lesion obviously involves immune phenomena with participation of Australia antigen or other antigens. The hyperinflation syndrome, observed in four patients without past bronchopulmonary disease, is probably due to emphysema, whose association with chronic hepatitis has not been reported before.

3254 CANCER OF THE LIVER: PATHOGENESIS AND RECENT AETIOLOGICAL FACTORS. (Eng.) Anthony, P. P. (Middlesex Hosp. Medical Sch., London W1, England). *Trans. R. Soc. Trop. Med. Hyg.* 71(6):466-470; 1977.

The pathogenesis of experimental liver tumors and precursor lesions of liver cancer and the etiology of liver cancer in man are reviewed. The majority of chemical carcinogens require metabolic conversion to a reactive derivative by liver microsomal enzymes. Numerous different effects are produced in every part of the cell, but the most important is probably the damage to nuclear DNA. In experimental liver carcinogenesis, results depend on dose and rate of administration of a carcinogen, the species of the animals, age, sex, state of nutrition, and manipulation of the hormonal background or the rate of liver cell turnover. The process of carcinogenesis includes several phases of neoplastic initiation and development, which include initiation that produces altered hepatocytes, phenotypic changes, nodule formation, and the final cancer phase. Three populations of morphologically recognizable altered hepatocytes act at different stages of liver carcinogenesis. In man, a macronodular cirrhosis and hepatitis B are usually found in association with liver carcinoma. A familial occurrence of liver carcinoma was reported both with and without cirrhosis. There is no evidence that alcohol itself, without cirrhosis and malnutrition, increases the risk of liver tumor. It is also unclear whether iron overload and parasite infestations of the liver are associated with carcinoma. Several naturally occurring substances such as pyrrolizidine alkaloids, cycasin, safrole, some native remedia, and nitrosamines are among carcinogens. Liver tumors can be caused by such drugs and chemicals as the contrast medium Thorotrast, potassium arsenite in Fowler's solution, arsenical insecticides, vinyl chloride monomer, and anabolic/androgenic steroids.

3255 DEARTERIALIZATION OF THE LIVER FOR METASTATIC CANCER: CLINICAL, ANGIOGRAPHIC AND PATHOLOGIC OBSERVATIONS. (Eng.) McDermott, W. V., Jr.; Paris, A. L.; Clouse, M. E.; Meissner, W. A. (185 Pilgrim Rd., Boston, MA 02215). *Ann. Surg.* 187(1):38-46; 1978.

Experience with five cases of dearterialization of the liver for metastatic cancer is presented. Subjective and objective improvement in carcinoid syndrome for 2 yr was obtained in one patient who is living with extensive visceral and skeletal metastases 40 months after dearterialization. Excellent palliation was achieved in two other patients, one with carcinoma of the endometrium and the other with adenocarcinoma of the left colon; both died at 1 yr and 11 months, resp., after surgery. No improvement or palliation was observed in the two remaining patients. In one, the extent of dearterialization was inadequate, while in the other extensive necrosis of hepatic metastases was observed at postmortem examination. There was no evidence of serious damage to the hepatic parenchyma, either by liver function tests or by microscopy, as a result of interruption of arterial inflow. Microscopic observations of the tumors revealed extensive necrosis in all large tumor masses, but smaller nodules (less than 50 μm in diameter) maintained apparent viability. Postoperative angiographic studies revealed the difficulty in achieving complete dearterialization and the rapidity with which large collateral channels develop. Based on these arteriographic observations, the following operative procedure is recommended: dissection; identification and ligation of the common and proper hepatic arteries, the gastroduodenal artery, the right and left hepatic arteries, and the left gastric artery; and division of the triangular, falciform, and hepatorenal ligaments. This degree of devascularization should provide maximum effect on the tumor, and it was shown in two of the above cases that hepatic parenchyma survives even extensive dearterialization.

3256 BENIGN NON-PARASITIC CYSTS OF THE LIVER: A REVIEW OF 18 CASES. (Eng.) Wong, J.; Little, J. M. (Dept. Surgery, Univ. Sydney, Sydney, Australia). *Aust. N.Z. J. Surg.* 47(2):209-215; 1977.

Eighteen cases of benign nonparasitic cysts of the liver, seen during 1965-1974, are reviewed, with case histories given for four patients. Ten patients had the localized form and eight the generalized form of cystic disease. The ratio of women to men was 2:1 in both groups and the average age was 50. A correct preoperative diagnosis was made in five patients; in two patients with solitary cysts, the diagnosis was made at liver biopsy and in three polycystic patients, the diagnosis was made from their clinical features and investigatory findings. Associated conditions for which operation was necessary included carcinoma of colon or rectum (3), chronic duodenal ulcer (2), ruptured spleen, esophageal stricture, and lipoma of the ileocecal valve (1 each). Two patients died from complications of the cyst or of operations directed at the cyst: one from intrathoracic rupture of an abscess in the polycystic liver, and the other after cystojejunostomy, from cardiac and renal failure. Two of the patients suffered complications that have not been previously reported, i.e., abscess formation in a polycystic case and retrohepatic caval obstruction by a solitary cyst. Although many characteristics of the cysts in both solitary and polycystic groups are similar, the major differences are a positive family history, the association of cystic disease elsewhere, and the associated congenital anomalies in the polycystic group.

3257 HEPATIC GRANULOMATA: PROBLEMS IN INTERPREPARATION. (Eng.) Klatskin, G. (No affiliation given). *Mt. Sinai J. Med.* 46(6):798-812; 1977.

Problems in interpretation of hepatic granulomata are discussed and illustrated by a short review of data from 742 cases of biopsy-documented hepatic granulomata. The 565 cases of epithelioid granulomata were classified into three groups: (1) granulomatous disease (319 patients), (2) underlying hepatic disease (174), and (3) miscellaneous disorders of other etiology (72). In 177 cases, the lesions were diagnosed as lipogranulomata. A high incidence of hepatic granulomata (94%) was observed in sarcoidosis. However, such lesions gave rise to few clinical manifestations or hepatic impairment. The hepatic lesions in most forms of granulomatous disease were so similar that the diagnosis depended on the clinical features, serologic and skin tests, and bacterial and viral cultures rather than on histologic examination. Nonspecific granulomata can be found in primary biliary cirrhosis, Laennec's cirrhosis, acute viral hepatitis, and cytomegalovirus hepatitis. The third category of patients with granulomata were those whose underlying disease was primarily neither granulomatous nor hepatic in nature. These had lymphoma, carcinoma, ulcerative colitis, or Crohn's disease (19); acute viral or bacterial infections (8); psoriasis with gout and/or hyperuricemia (8); or disorders that defied diagnosis (37). In the latter cases, the hepatic granulomata may represent a nonspecific response to underlying disease or may be attributable to the action of some specific agent. The hepatic granulomata found in association with liver disease usually represent a nonspecific response to underlying disease.

3258 REGULATION OF BILE ACID SYNTHESIS IN HYPERLIPOPROTEINEMIA. (Eng.) Hellstrom, K.; Angelin, B.; Einarsson, K.; Kallner, M.; Leijd, B. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 235-239; 1977.

Bile acid kinetics were studied with the isotope-dilution technique and the serum triglyceride turnover with the [^{3}H]glycerol technique in patients with hyperlipoproteinemia (HLP). The formation of bile acid in HLP type IV, characterized by elevated levels of very low-density lipoproteins (VLDL), exceeded that seen in HLP types IIa (elevated levels of low-density lipoproteins [LDL]) and IIb (elevated levels of LDL and VLDL). The formation of triglyceride correlated significantly with that of bile acid (particularly with cholic acid) in HLP type IIa ($p<0.001$) and type IV ($p<0.01$) and in the combined series of patients ($p<0.001$). Further evidence of an integration between triglyceride and bile acid formation was obtained in HLP type II by studying regimens that may primarily increase (cholestyramine administration) or inhibit (chenodeoxycholic acid feeding) bile acid formation and in HLP type IV by studying regimens that inhibit (clofibrate or nicotinic acid treatment or weight reduction) or stimulate (carbohydrate-rich diets) the hepatic triglyceride formation.

3259 MALIGNANT PAPILLOMATOSIS OF THE INTRAHEPATIC BILE DUCTS.

(Eng.) Helpap, B. (Inst. Pathology, Univ. Bonn, Postfach 2120, D-5300 Bonn-Venusberg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):419-425; 1977.

A case of a woman born in 1934, with recurring intrahepatic bile duct papillomatosis involving the left hypoplastic hepatic lobe, is reported. A biopsy of the left lobe showed chronic cholangitis, pericholangitis, and biliary cirrhosis. Treatment included a left hemihepatectomy with excision of biliogastric and external fistulas. A gastroduodenal fistula developed that excreted 3 l of fluid daily, and the papillomatosis progressed to a mucin-secreting papillary adenocarcinoma. The patient died despite infusions of electrolyte solutions (6 l/day). A review of 12 previously described cases of extra- and intrahepatic bile duct papillomatosis is given, and it is suggested that these lesions be considered as low-grade carcinomas as soon as they are diagnosed.

3260 USE OF HEMATIN IN THE ACUTE ATTACK OF THE "INDUCIBLE" HEPATIC PORPHYRIAS.

(Eng.) Watson, C. J.; Pierach, C. A.; Bossenmaier, I.; Cardinal, R. (Northwestern Hosp., Minneapolis, MN). *Adv. Intern. Med.* 23:265-286; 1978.

The role of hematin (HT) in early termination of acute attacks of the "inducible" hepatic porphyrias was studied in 24 patients who had acute intermittent porphyria, porphyria variegata, or hereditary hepatic coproporphyria. An improved HT perfusion method was applied. The dose of HT per each infusion performed at 12 to 24 hr intervals was 4 mg/kg body weight and also depended on the clinical condition of the patient. The effect of HT depended on the amount infused per unit time. According to severity of neurologic symptoms, the following classes of the disease were encountered: (A) autonomic signs and symptoms, Gunther's triad, leg pain, paresthesis, restricted paresis, psychiatric manifestations, and mild hypertension; (B) autonomic signs, severe peripheral neuropathy, quadriparesis, hypertension, tachycardia, urinary retension, dysuria, obstipation, psychotic seizures, and inappropriate antidiuretic hormone syndrome (IADHS); and (C) life-threatening central, peripheral and autonomic disturbances, extensive paralysis, quadriparesis, psychotic symptoms, seizures, IADHS, and disturbed consciousness or coma. Selected case reports are presented. In cases of class A severity, one to three infusions were sufficient to cause a prompt recovery, while in cases of class B or C, a very slow but considerable improvement was observed after four to eight HT infusions. Infusion of HT is a valuable treatment in acute attacks of the hepatic porphyrias.

3261 LIVER ULTRASTRUCTURE IN PSORIATICS RELATED TO METHOTREXATE THERAPY. 1. A PROSPECTIVE STUDY OF FINDINGS IN HEPATOCYTES FROM 24 PATIENTS BEFORE AND AFTER METHOTREXATE THERAPY.

(Eng.) Nyfors, A.; Hopwood, D. (Dept. Dermatology, Finson Inst., Copenhagen, DK-2100, Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85(6):787-800; 1977.

Liver biopsies from 24 psoriatics with severe psoriasis before and after methotrexate (MTX) therapy were studied by light and electron microscopy. MTX apparently caused hepatocyte damage, which was reflected by the increased number of membrane whorls ($p<0.05$) and the increased accumulation of lipid droplets ($p<0.05$) observed in the patients' hepatocytes in comparison with that in controls. There was an increase ($p<0.05$) in autophagic vacuoles, which mostly contained glycogen and cell sap with residual bodies. These residual bodies were found in an increased number in the nearby Kupffer cells. Crystals occurred in megamitochondria in most patients before and after MTX therapy. Some of these crystals were found free in the cytoplasm. Mitochondria containing crystals were shown in autophagic vacuoles, representing possible pathways of their breakdown. Bile canaliculi commonly contained debris, but only one patient had evidence of cholestasis. There was no significant change in nuclei, Golgi apparatus, or the endoplasmic reticulum and no statistically significant correlation between the changes in the treated patients and the total dose of MTX given.

3262 LIVER ULTRASTRUCTURE IN PSORIATICS RELATED TO METHOTREXATE THERAPY. 2. FINDINGS IN BILE DUCTS FROM 11 METHOTREXATE TREATED PSORIATICS AND 2 CONTROLS.

(Eng.) Hopwood, D.; Nyfors, A. (Dept. Dermatology, Finson Inst., Copenhagen, DK-2100 Denmark). *Acta Pathol. Microbiol. Scand.* [*A*] 85(6):801-811; 1977.

Liver biopsy specimens from 11 psoriatics receiving methotrexate (MTX) were studied with the light and electron microscope and compared with normal material. Thick sections (1 μm) showed light and dark cells in biliary epithelium and lipofuscin granules. At the ultrastructural level, the presence of these structures was confirmed. The lumen of the bile ducts contained debris. The microvilli were decreased in number, and damaged forms were seen. Damage to the biliary epithelial mitochondria was widespread, and there were foci of intracellular edema. The Golgi apparatus was hypertrophied and dilated. Atrophic cells were seen. The lateral intercellular spaces were dilated and contained debris, and the basement membrane showed zones of duplication. Similar changes were found in the ducts of Hering.

3263 THE COAGULATION DISORDER OF ORTHOTOPIC HEPATIC TRANSPLANTATION.

(Eng.) Bohming,

H. J. (Krankenhaus Amstetten, A-3300, Austria). *Semin. Thromb. Hemostas.* 4(1):57-82; 1977.

Coagulation data in clinical and experimental liver transplantation accumulated over the last 14 yr are reviewed, and coagulation findings in a new series of 10 human liver recipients are presented. Systemic fibrinolysis is transiently induced during orthotopic hepatic transplantation, but its significance for the generation of coagulation changes and consecutive hemorrhages has been questioned. Intravascular coagulation has been encountered both during recipient hepatectomy (particularly the anhepatic phase) and after revascularization of the graft. In human liver transplantation, exogenous heparin as well as fibrin degradation products probably account for the prolongation of thrombin time, which often is encountered after revascularization of the hepatic graft. Bleeding was significant in all 10 patients during recipient hepatectomy and again, in some of them, after revascularization of the graft. The instant incoagulability of the recipient's blood, which was noted as soon as the liver had been revascularized in four new cases, was due to heparin contained in the solution used for the graft perfusion; this kind of anticoagulant activity was not observed in those recipients who had been given livers perfused with heparin-free solutions. The severity as well as duration of the coagulation changes following orthotopic hepatic transplantation depend primarily on the quality of the donor organ, with an adequately preserved liver almost instantaneously resuming its functions.

3264 CYTOTOXICITY OF LYMPHOCYTES AGAINST HUMAN LIVER PROTEIN IN PATIENTS WITH HEPATOPATHY. (Dut.) Vogten, A. J. M. (No affiliation given). *Ned. Tijdschr. Geneeskd.* 121(28):1155; 1977.

3265 HEPATIC TISSUE VENTILATION IN BILE OUTFLOW SYSTEM PATHOLOGY AND THE EFFECT OF HYPERBARIC OXYGENATION ON THE COURSE OF HEPATIC INSUFFICIENCY. (Rus.) Belokurov, Ju. N.; Murav'eva, L. A.; Rybachkov, V. V. (Clinic Hosp. Surgery, Yaroslavl Medical Inst., Yaroslavl, USSR). *Vestn. Khir.* 117(9):34-37; 1976.

3266 LIVER PATHOLOGY FOLLOWING MYOCARDIAL INFARCTION. (Rus.) Guzeeva, V. A. (First Dept. Therapy, Alma-Ata Inst. Advanced Medical Studies, Alma-Ata, USSR). *Kardiologiia* 17(1): 119-123; 1977.

3267 INTRAVITAL STUDY OF ENERGY EXCHANGE IN THE LIVER OF MITRAL STENOSIS PATIENTS. (Rus.) Meshalkin, E. N.; Kremleva, L. A.; Arkhipova, G. F.; Shurgaya, A. M.; Chasovskikh, G. G.; Korepanova, G. A.; *et al.* (Inst. Circulatory Pathology, RSFSR Ministry of Public Health, Novosibirsk, USSR). *Kardiologiia* 17(1):54-57; 1977.

3268 HEPATIC BLOOD CIRCULATION DURING OPERATIONS ON THE EXTRAHEPATIC BILE DUCTS PERFORMED UNDER NEUROLEPTOANALGESIA AND ETHER ANESTHESIA. (Rus.) Dubitsky, A. E. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (2):44-50; 1977.

3269 HEMIHEPATECTOMY WITH "BYPASS" OF THE INFERIOR VENA CAVA: REPORT OF NINE CASES OF MALIGNANT HEPATIC TUMORS IN CHILDREN. (Fre.) Monereo, J. (Pediatric Clinic "La Paz," Madrid, Spain). *Ann. Chir. Infant.* 18(1):77-83; 1977.

3270 RADIATION THERAPY OF LIVER CANCER METASTASES. (Jpn.) Okawa, T.; Nakama, M.; Ogawa, S.; Kaneta, K.; Tsuya, A.; Kawai, T. (Cancer Res. Center Hosp., Tokyo, Japan). *Jpn. J. Cancer Clin.* 23(8):822-830; 1977.

3271 LIVER TUMORS FOLLOWING THERAPY WITH CONTRACEPTIVES AND ANABOLIC DRUGS. (Ger.) Scheuer, A.; Lehmann, F. G. (Medizinische Universitatsklinik, E. Mannkopffstrasse 1, D-3550 Marburg/ Lahn, W. Germany). *Internist (Berlin)* 18(4):208-214; 1977.

3272 HEMANGIOENDOTHELIOMA OF THE LIVER IN CHILDREN. (Fre.) Hata, Y.; Uchino, J.; Kasai, Y. (First Dept. Surgery, Hokkaido Univ., Sapporo, Japan). *Ann. Chir. Infant.* 18(1):62-65; 1977.

3273 TRAUMATIC SUBCAPSULAR LIVER HEMATOMA. (Ger.) Mebold, A.; Gonzenbach, R. (Kantonsspital, CH-8500 Frauenfeld, Switzerland). *Helv. Chir. Acta* 44(1/2):103-105; 1977.

3274 DIRECT IMAGE OF HEPATIC LIPOMA. (Fre.) Hoeffel, J. C.; Etzel, J. C.; Drouin, P.; Boissel, P. (Hopital Jeanne d'Arc, 54 201, Dommartin-les-Toul, France). *J. Can. Assoc. Radiol.* 28(2): 153-155; 1977.

3275 HEPATIC TERATOMA. REPORT OF ONE CASE IN A CHILD. (Fre.) Fabre, C.; Gregoire, A.; Scheiner, C.; Basbous, D.; Lebreuil, G. (Laboratoire d'Anatomie pathologique, Faculte de Medecine, bd P.-Dramard, 13326 Marseille Cedex 3, France). *Arch. Anat. Cytol. Pathol.* 25(3):209-212; 1977.

3276 MULTIPLE CHOLANGIOGENIC LIVER ABSCESSES. (Rus.) Pomelova, L. A.; Zavenian, Z. S.; Gul'diaev, V. G. (Dept. Hepatic and Biliary Surgery, All-Union Scientific Res. Inst. Clinical and Experimental Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (3):52-53; 1977.

3277 AGENESIS OF THE RIGHT HEPATIC LOBE. (Fre.) Routier, G.; Petyt, B.; Florin, M.;

Bernard, J. M.; Deffontaine, O. (Clinique St-Jean, 34, rue St-Jean, F 59100 Roubaix, France). *Ann. Med. Interne (Paris)* 128(3):275-280; 1977.

3278 LIVER AND HEREDITARY ALPHA-1-ANTITRYPSIN DEFICIENCY IN ADULTS. (Fre.) Feldmann, G. (Hopital Beaujon, 100, boulevard du General-Leclerc, 92110 Clichy, France). *Rev. Fr. Trans. Immunohepatol.* 20(1):95-104; 1977.

3279 ALPHA-1-ANTITRYPSIN DEFICIENCY AND LIVER PATHOLOGY IN CHILDREN. (Fre.) Hadchouel, M.; Odievre, M. (Hopital de Bicetre, 94270 Le Kremlin-Bicetre, France). *Rev. Fr. Trans. Immunohepatol.* 20(1):105-106; 1977.

3280 CLINICO-LABORATORY ASPECTS OF LIVER ALVEOCOCCOSIS. (Rus.) Vasiliev, R. Kh.; Nabokov, Sh. A. (Kamchatka Oblast Dept. Public Health, Petropavlovsk-Kamchatskii, USSR). *Klin. Med. (Mosk.)* 55(4):78-80; 1977.

3281 LONG-TERM RESULTS OF LIVER RESECTION FOR ALVEOCOCCOSIS. (Rus.) Zhuravlyov, V. A.; Vasilyev, P. N. (Surgical Clinic, Kirov Scientific Res. Inst. Blood Transfusion, Kirov, USSR). *Klin. Khir.* (2):41-44; 1977.

3282 Echinococcus alveolaris AND cysticus OF THE LIVER. (Ger.) Gamstatter, G.; Kurock, W.; Herrmann, G. (Chirurgische Universitatsklinik, Langenbeckstrasse 1, 6500 Mainz, W. Germany). *Z. Gastroenterol.* 15(2):126-137; 1977.

3283 THE IMMEDIATE AND LATE RESULTS OF TREATMENT FOR HEPATIC ECHINOCOCCOSIS. (Rus.) Askerkhanov, R. P.; Saidov, G. S.; Makhatilov, M. M. (Surgical Clinic, Dagestan Medical Inst., Dagestan, USSR). *Vestn. Khir.* 116(6):41-46; 1976.

3284 SCINTIGRAPHIC AND ULTRASONIC DIAGNOSIS OF HYDATID DISEASE OF THE LIVER. (Hun.) Csuz, L.; Kun, L. (Magyar Allamvasutak Korhaza, "A" Belgyogyaszati Osztaly, Pecel, Hungary). *Orv. Hetil.* 118(17):994-996; 1977.

3285 CURRENT THERAPEUTIC POSSIBILITIES IN HEPATIC ENCEPHALOPATHY. (Ita.) Imler, M. (Centre Hospitalier Universitaire, 67005 Strasbourg, Cedex, France). *Minerva Med.* 68(15):961-976; 1977.

3286 INDICATION AND PROGNOSIS OF HETEROLOGOUS LIVER PERFUSION IN THE TREATMENT OF SEVERE HEPATIC COMA. (Ger.) Schwarzer, R.; Otto, U.; Keitel, R.; Kohler, K.; Graf, B. (Chirurgische Klinik, Karl-Marx-Universitat, Liebigstr. 20a, DDR-701 Leipzig, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(3/4):187-188; 1976.

3287 THERAPY OF ACUTE HEPATIC FAILURE. (Ger.) Reiter, H. J. (Medizinische Universitatsklinik, Mannkopffstrasse 1, D-3550 Marburg, W. Germany). *Internist (Berlin)* 18(4):215-220; 1977.

3288 HEMOBILIA SYNDROME. A RARE COMPLICATION OF DIRECTED LIVER BIOPSY. (Ger.) Pohle, W.; May, B.; Bohle, H.; Fritze, E. (Berufsgenossenschaftl. Krankenanstalten Bergmannsheil, 4630 Bochum, W. Germany). *Med. Welt* 28(3):125-126; 1977.

3289 CLINICO-BIOCHEMICAL CHARACTERISTICS OF LIVER CIRRHOSIS IN HEPATO-CEREBRAL DYSTROPHY (WILSON-KONOVALOV'S DISEASE). (Rus.) Makarova, V. A. (Dept. Neuropathy, Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Klin. Med. (Mosk.)* 55(4):68-74; 1977.

3290 LIPID METABOLISM IN PATIENTS WITH MECHANICAL JAUNDICE OF DIFFERENT ETIOLOGY. (Rus.) Shalimov, A. A.; Soroka, A. M.; Shuliak, O. S.; Ishchuk, O. E. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Vrach. Delo* (9):109-111; 1976.

3291 HEPATIC LESIONS IN PRIMARY MYELOSCLEROSIS IN ADULTS. (Fre.) Waitz, R.; Mayer, S.; Mayer, G.; Oberling, F. (67, allee de la Robertsau, 67000 Strasbourg, France). *Rev. Fr. Gastroenterol.* (126):27-31; 1977.

3292 ESSENTIAL REGRESSIVE PELIOSIS OF LIVER. REPORT OF ONE CASE. (Fre.) Duffaud-Thierman, D.; Hecht, Y.; Ragasol, A.; Ferrier, J. P.; Callard, P.; Goldlust, D. M. (Hopital Jean Verdier, avenue du 14 Juillet, F 93140 Bondy, France). *Nouv. Presse Med.* 6(14):1238; 1977.

3293 ERYTHROPOIETIC PROTOPORPHYRIA: I. CLINICAL AND PATHOGENETIC PROBLEMS. (Ger.) Honigsmann, H. (Universitats-Hautklinik, Anichstrasse 35, A-6020 Innsbruck, Austria). *Z. Hautkr.* 52(9):495-509; 1977.

3294 ANOTHER CASE OF REYE'S SYNDROME IN HUNGARY. (Hun.) Foldes, Gy.; Pappert, K.; Pleskott, K. (Orvostovabbkepzo Intezet, II. Gyermekgyogyaszati Klinika, Budapest, Hungary). *Orv. Hetil.* 118(3):148-149; 1977.

3295 LIVER TRANSPLANTATION. (Rus.) Gagua, A. M. (Inst. Experimental Clinical Surgery, Georgian SSR Acad. Sciences, USSR). *Bull. Acad. Sci. Georgian SSR* 84(1):205-208; 1976.

3296 LIVER DISEASE IN RENAL ALLOGRAFT RECIPIENTS. (Jpn.) Akiyama, T. (Osaka Univ. Hosp., Osaka, Japan). *Jpn. J. Urol.* 67(2):107-115; 1976.

3297 NEW PHYSIOLOGICAL REVASCULARIZATION FOR HETEROTOPIC LIVER TRANSPLANTATION. (Fre.) Pouyet, M.; Treboux, M. (Clinique Claude-Bernard, 69600 Oullins, France). *Lyon Chir.* 73(4):308-309; 1977.

3298 PATHOGENESIS OF HEPATIC FAILURE. (Eng.) Popper, H. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Kidney Int.* 10(Suppl. 7):225-228; 1976.

See also, 2816, 2849, 2854, 2861, 2865, 2937, 2943, 2945, 2946, 2956, 2960, 2961, 2975, 2986, 3012, 3013, 3016, 3017, 3018, 3143, 3155, 3164, 3181, 3300, 3340, 3372, 3426, 3454, 3456, 3461, 3463.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

3299 TREATMENT OF CRIGLER-NAJJAR SYNDROME. (Ger.) Plochl, E.; Hohenwallner, W. (Kinderspital der Landeskrankenanstalten Salzburg, Mullner Hauptstrasse 48, A-5020 Salzburg, Austria). *Wien. Med. Wochenschr.* 128(3):70-73; 1978.

Crigler-Najjar syndrome was diagnosed in a 6-week-old baby girl. Phenobarbital therapy proved to be ineffective. Phototherapy (3,700 lux, 150 W) was effective; it reduced the serum bilirubin level to below 20 mg% by the age of 14 months, but retardation of mental development and of motor function could not be prevented. The findings indicate the importance of early diagnosis of Crigler-Najjar syndrome (before the age of 6 weeks).

3300 MITOCHONDRIAL PATHOLOGY IN THE LIVER IN A PATIENT WITH THE DUBIN-JOHNSON SYNDROME. (Eng.) Enat, R.; Barzilai, D. (Rambam Medical Center, Technion-Israel Inst. Technology, Haifa, Israel). *Isr. J. Med. Sci.* 13(12):1197-1205; 1977.

The mitochondrial pathology of a liver biopsy from a 52-yr-old woman with the Dubin-Johnson syndrome is described. Electron microscopy showed in some hepatocytes an accumulation of typical Dubin-Johnson pigment that was composed of three elements: dark material as broad masses, light areas as fine granules, and homogenous fat-like droplets. Some cells showed dilated smooth endoplasmic reticulum. Although many cells did not show any abnormality, there were cells, mainly those with Dubin-Johnson pigment, with multiple vacuoles (0.4-25.5 μm in diameter) at the vascular poles of the cells. These vacuoles were either fat droplets or, in the majority of cases, included debris composed of sparse fine granular material, clumps of dense material, and multiple membranes. Many of these vacuoles were enclosed by a double membrane. Although many mitochondria appeared normal, there were others that showed disintegration of the matrix with partial to complete loss of mitochondrial cristae, lucent areas, isolated mitochondrial membranes, membranous whorls, and myelin figures. Severe mitochondrial damage as described above has not been reported in the hepatocytes of patients with the Dubin-Johnson syndrome, and it is recommended that mitochondrial damage be looked for in future electron microscopy studies of liver biopsies from patients with the Dubin-Johnson syndrome.

3301 GILBERT'S SYNDROME: THE QUALITATIVE BASIS OF THE DISORDER [Abstract]. (Eng.) Gordon, E. R.; Shaffer, E. A.; Pare, P.; Goresky, C. A. (Montreal General Hosp., Montreal, Quebec, Canada). *Clin. Res.* 25(5):687A; 1977.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

3302 PATHOLOGY AND BIOCHEMISTRY OF PARACETAMOL-INDUCED LIVER DAMAGE. (Eng.) Williams, R.; Davis, M. (King's Coll. Hosp. Medical Sch., London, England). *Proc. Eur. Soc. Toxicol.* 18:27-40; 1977.

Clinical and experimental studies on paracetamol (acetaminophen, *N*-acetyl *p*-aminophenol) overdose and the treatment and prevention of overdoses are reviewed. The effects of a paracetamol overdose vary from a trivial clinical illness to severe fulminant hepatic failure, which carries a mortality of 80% or higher. In the less severely affected patients, there is necrosis of hepatocytes in the centrilobular areas, while in those who progress to fulminant hepatic failure, wide areas of confluent necrosis are seen. Survival is unlikely if more than 60% of liver cells are necrotic. If the patient survives the acute illness, liver function and structure return completely to normal. Paracetamol overdose produces hepatic necrosis by a direct action on the liver; its effects are dose related. The quantity of paracetamol metabolite bound within the liver, which correlates with the degree of hepatic necrosis, increases in proportion to the rate of urinary excretion of cysteine and mercapturic acid conjugates of the drug, suggesting that hepatic damage from paracetamol is due to overproduction of the reactive precursor of these conjugates. Neither depletion of hepatocellular glutathione nor covalent binding of the reactive paracetamol metabolite will produce hepatocellular necrosis if present singly, but, if they coexist, hepatic damage will ensue. Current treatment depends chiefly upon the administration of compounds that will substitute for hepatic reduced glutathione.

3303 OCCUPATIONAL HEPATOTOXIC SUBSTANCES. (Fre.) Tolot, F. (No affiliation given). *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 36(1/2):199-200; 1977.

3304 INDUSTRIAL HEPATOTOXIC SUBSTANCES. PATHOLOGICAL ANATOMY. (Fre.) Lesbros, F. (No affiliation given). *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 38(1/2):200-205; 1977.

3305 THE LIVER MICROSOMAL SYSTEM: PRACTICAL IMPLICATIONS FOR THE DIAGNOSIS AND PREVENTION OF TOXIC HEPATITIS CAUSED BY TOXIC INDUSTRIAL SUBSTANCES. (Fre.) Prost, G.; Rigaud, M.; Pelletier, N. (Institut universitaire de medecine du travail de Lyon, Lyon, France). *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 38(1/2):225-229; 1977.

See also, 3252.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

3306 VIRAL HEPATITIS RESEARCH LEADING TOWARDS CONTROL BY VACCINATION. (Eng.) Melnick, J. L.; Hollinger, F. B.; Dreesman, G. R. (Baylor Coll. Medicine, Houston, TX 77025). *Arch. Roum. Pathol. Exp. Microbiol.* 35(1/2):5-65; 1976.

Studies that may result in the eventual control of hepatitis viruses A and B by vaccination are reviewed. The physicochemical characteristics of both virus types are discussed, including the composition of the hepatitis virus B particle and its antigenic determinants, collectively termed hepatitis B surface antigen (HBsAg). HBsAg is composed of several distinct antigenic specificities, but antibody to one of them, a group-reactive determinant (a), confers protection against all subtypes. The recently discovered e antigen can be used to determine the infectivity of blood. Anti-e seems to indicate that the blood is noninfectious even if HBsAg is circulating. The results of laboratory tests, including tests for liver function, tests for hepatitis type B and its antigens, and tests for hepatitis type A, and studies of the serological events in hepatitis B infection, virus-host immune reactions, and epidemiology, all contribute to the development of a possible vaccine for future control of hepatitis B. A new concept has developed for producing a virus vaccine: an immunizing antigen can be obtained from healthy carriers, preferably those possessing anti-e antibodies. However, immunization with purified 22-nm whole-particle preparations of HBsAg should be approached with extreme caution. The feasibility of using specific subunits derived from 22-nm HBsAg-containing particles should be investigated as a possible alternative vaccine.

3307 THE EPIDEMIOLOGY OF HEPATITIS B INFECTIONS IN A POLY-ETHNIC POPULATION. (Eng.) Banffer, J. R. J.; Brunings, E. A.; Gielis-Proper, F. K.; Schmitz, P. I. M. (Municipal Lab. for Epidemiological Bacteriology, c/o Public Health Service, P.O. Box 333, Schiedamsedijk 95, Rotterdam, Netherlands). *Am. J. Epidemiol.* 106(6):507-511; 1977.

Blood samples collected from 765 male donors of varying ethnic groups residing in Paramaribo, Surinam were analyzed by radioimmunoassay for hepatitis B surface antigen (HBsAg). Hepatitis B antibodies (anti-HBs) were determined in 738 of the donors. The prevalence of HBsAg in Indian donor subjects of Creole origin, subjects of mixed origin, Bushland Creoles, and Indonesians was 2.9, 3.6, 5.7, 8.1, and 18.6%, resp. If the Indonesians were excluded, there was no statistically significant difference among the other groups as estimated with the Spitz-L test. The difference between those groups and Indonesians was significant ($0.001<p<0.01$). Anti-HBs showed the highest prevalence in Indonesians

(61.3%) and was 34 and 26% in Creoles and Indians, resp. No significant difference was found between these groups if the Indonesians were excluded. Prevalence of anti-HBs in Indonesians was significantly higher than in other ethnic groups (p<0.001). The prevalence of HBsAg and anti-HBs in Creoles and mixed groups increased with age. Since a genetic hypothesis of greater prevalence of HBsAg and anti-HBs in Indonesians has previously been ruled out, it is suggested that family clustering in this ethnic group results in a greater exposure risk to hepatitis B virus.

3308 THE PROGNOSTIC SIGNIFICANCE OF THE IN VITRO COMPLEMENT FIXATION IN BIOPSIES OF PATIENTS WITH ACUTE VIRAL HEPATITIS TYPE B [Abstract]. (Eng.) Rizzetto, M.; Bonino, F.; Diana, S.; Verme, G. (Ospedale Mauriziano Umberto I, Torino, Italy). *Digestion* 14(5/6):486-487; 1976.

3309 HEPATITIS B AND ITS SUBTYPES IN A STUDY OF VIRAL HEPATITIS IN WEST LONDON [Abstract]. (Eng.) Sanderson, I. M.; Farrow, L. J.; Lamb, S. G.; Lindon, R. L.; Coghill, N. F.; Clifford, R. E.; *et al.* (West Middlesex Hosp., London, England). *Gut* 18(5, Part 2):A421; 1977.

3310 PREVALENCE OF HEPATITIS B SEROLOGIC MARKERS IN DENTAL HYGIENISTS [Abstract]. (Eng.) James, S. P.; Sampliner, R. E. (Div. Gastroenterology, Univ. Maryland, Baltimore, MD). *Gastroenterology* 72(5, Part 2):1075; 1977.

3311 THE EPIDEMIOLOGY OF HEPATITIS B IN A RESIDENTIAL INSTITUTION FOR THE MENTALLY RETARDED. (Eng.) Boughton, C. R.; Hawkes, R. A.; Schroeter, D. R.; Harlor, J. A. (Prince Henry Hosp., Little Bay, New South Wales 2036, Australia). *Aust. N.Z. J. Med.* 6(6):521-529; 1976.

3312 TYPE B AND NON-B HEPATITIS IN JERUSALEM. (Eng.) Sandler, S. G.; Shouval (Steigbuegel), D.; Marcus, M.; Eliakim, M. (Hadassah Univ. Hosp., Jerusalem, Israel). *Bull. W.H.O.* 54 (2):193-198; 1976.

3313 SOLID-PHASE ENZYME IMMUNOASSAY FOR HEPATITIS B SURFACE ANTIGEN. (Eng.) Wei, R.; Knight, G. J.; Zimmerman, D. H.; Bond, H. E. (Electro-Nucleonics Lab. Inc., 4809 Auburn Ave., Bethesda, MD 20014). *Clin. Chem.* 23(5):813-815; 1977.

3314 A TRICHROME STAIN FOR THE DETECTION OF HEPATITIS B SURFACE ANTIGEN IN LIVER BIOPSIES. (Eng.) Gubetta, L.; Rizzetto, M.; Verme, G. (Ospedale Mauriziano Umberto I, Torino, Italy). *Pathologica* 68(983/984):413-416; 1976.

3315 ENHANCED ANTI-HBs PRODUCTION IN THE PATHOGENESIS OF FULMINANT HEPATITIS B [Abstract]. (Eng.) Woolf, I. L.; Shiekh, N. E. L.; Cullens, H.; Zuckerman, A. J.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):556; 1976.

3316 DISTINCTIVE INTRAHEPATIC DISTRIBUTION OF HBs AND HBc ANTIGENS IN PATIENTS WITH ACUTE AND CHRONIC HEPATITIS B [Abstract]. (Eng.) Ray, M. B.; Desmet, V. J. (Departement Medische Navorsing, Academisch Ziekenhuis Sint Rafael, Leuven, Belgium). *Digestion* 14(5/6):459; 1976.

3317 SERUM ANTI-HBc TITERS IN CHRONIC LIVER DISEASE [Abstract]. (Eng.) Hadziyannis, S. J.; Karvountzis, G. G. (Second Dept. Medicine, Athens Univ., Athens, Greece). *Digestion* 14(5/6): 460; 1976.

3318 ANTI-HBc TITERS, DNA POLYMERASE AND INTRAHEPATOCELLULAR HBcAg IN ASYMPTOMATIC HBsAg CARRIERS [Abstract]. (Eng.) Arnold, W.; Purcell, R. H.; Hess, G.; Knolle, J.; Meyer zum Buschenfelde, K. H. (Second Dept. Internal Medicine, Johannes Gutenberg Univ. Mainz, Mainz, W. Germany). *Digestion* 14(5/6):459-460; 1976.

3319 A PROSPECTIVE STUDY OF e-Ag AND ANTI-e HEPATITIS B [Abstract]. (Eng.) Schulman, A. N.; Fagen, N. D.; Morton, D. L.; Gitnick, G. L. (Univ. California, Los Angeles CA). *Gastroenterology* 72(5, Part 2):1128; 1977.

3320 IS e-SYSTEM A PREDICTOR OF CHRONIC ACTIVE LIVER DISEASE IN CARRIERS [Abstract]? (Eng.) Feinman, S. V.; Berris, B.; Sinclair, J. C.; Wrobel, D. M. (Mount Sinai Hosp., Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1186; 1977.

3321 T LYMPHOCYTE MEDIATED CYTOTOXICITY IN HBsAG POSITIVE LIVER DISEASE: DEVELOPMENT OF A NEW ASSAY [Abstract]. (Eng.) El Sheikh, N.; Osman, C. G.; Cullens, H.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., London, England). *Gut* 18 (5):A402-A403; 1977.

3322 ESSENTIAL MIXED CRYOGLOBULINEMIA: ANOTHER CONNECTIVE TISSUE DISORDER ASSOCIATED WITH HEPATITIS B VIRUS INFECTION [Abstract]. (Eng.) Tobias, H.; Levo, Y.; Franklin, E. (New York Univ. Sch. Medicine, New York, NY). *Gastroenterology* 72 (5, Part 2):1186; 1977.

3323 THE PROBABLE SIGNIFICANCE OF HYPERTRIGLYCERIDAEMIA IN VIRAL HEPATITIS. (Eng.) Aiyathurai, J. E. J.; Sentheshanmuganathan, S. (Dept. Pediatrics, Univ. Singapore, Singapore). *Aust. N.Z. J. Med.* 6(6):529-532; 1976.

3324 USE OF LIPOIC ACID IN THE COMPLEX TREATMENT OF PATIENTS WITH VIRAL HEPATITIS. (Ukr.) Loginova, N. S.; Mallina, E. R.; Usmanov, D. U. (Second Dept. Childhood Infections, Central Asiatic Medical Inst. Pediatric Medicine, USSR). *Pediatr. Akush. Ginekol.* (6):19-20; 1976.

3325 INCREASED FOLATE EXCRETION IN ACUTE HEPATITIS [Letter to Editor]. (Eng.) Tamura, T.; Stokstad, E. L. R. (Dept. Nutritional Sciences, Univ. California, Berkeley, CA 94720). *Am. J. Clin. Nutr.* 30(9):1378-1379; 1977.

3326 PROSPECTIVE STUDY IN POSTTRANSFUSION HEPATITIS IN PATIENTS WITH OPEN HEART SURGERY. (Ger.) Sugg, U.; Frosner, G. G.; Schneider, W.; Stunkat, R. (Chirurgische Universitats-Klinik, Calwerstrasse 7, D-7400 Tubingen, W. Germany). *Klin. Wochenschr.* 54(23):1133-1136; 1976.

3327 HBsAg, ALCOHOL, AND SYPHILIS [Letter to Editor]. (Eng.) Motoki, T.; Murao, S. (Second Dept. Internal Medicine, Tokyo Univ., Tokyo, Japan). *Lancet* 2(8034):404; 1977.

3328 INFECTIOUS HEPATITIS WITH EXCESSIVE HYPERBILIRUBINEMIA AND A HEMOLYTIC CRISIS IN AN 8-YEAR-OLD BOY. HIS G6PD DEFICIENCY WAS AN AGGRAVATING FACTOR. (Eng.) Fried, D.; Gotlieb, A.; Roitman, A. (Zahalon Government Hosp., Jaffa, Israel). *Clin. Pediatr.* 16(5):482-483; 1977.

See also, 2960, 2961, 3018, 3397, 3425.

LIVER AND BILIARY TRACT

Chronic Hepatitis

3329 PATHOGENETIC ASPECTS AND IMMUNOSUPPRESSIVE TREATMENT OF CHRONIC ACTIVE HEPATITIS. (Ita.) Miglio, F.; Facchini, A.; Stefanini, G. F.; Mariani, E.; Gasbarrini, G. B.; Labo, G. (Istituto di Clinica Medica e Gastroenterologia, Universita, Bologna, Italy). *Recent. Prog. Med. (Roma)* 62(4): 471-488; 1977.

The results of therapeutic trials with immunosuppressive drugs in the treatment of chronic active hepatitis are reviewed, and the preliminary results of a recent trial are presented. Prednisolone (15 mg/day) and azathioprine (75 mg/day) were compared in one trial in 47 patients. The findings demonstrated the higher effectiveness of prednisolone; it produced a greater reduction of the gamma-globulin level, lower incidence of esophageal varices, and a 2-yr survival rate of 95% (versus 72% in the azathioprine-treated group). New trials are being conducted with prednisolone (30 mg/day for 30 days, then 15 mg/day continuously), azathioprine (100 mg/day), and their combination (50 mg azathioprine plus 15 mg/day prednisolone for 30 days, then maintenance therapy with the same azathioprine dose plus 7.5 mg/day doses of prednisolone). The preliminary results indicate a good correlation between the lymphocytotoxicity test and the indices of necrosis, and parallel reduction of the cytotoxicity and of the SGOT level during the therapy.

3330 TREATMENT OF HBsAg-POSITIVE CHRONIC ACTIVE HEPATITIS WITH HUMAN FIBROBLAST INTERFERON [Abstract]. (Eng.) Kingham, J. G.; Ganguly, N. K.; Shari, Z. D.; Mendelson, R.; Cartwright, T.; Scott, G. M.; *et al.* (Southampton General Hosp., Southampton, England). *Digestion* 16(4):358; 1977.

3331 LEVAMISOLE IN THE TREATMENT OF HBs ANTIGEN-POSITIVE CHRONIC ACTIVE LIVER DISEASE [Abstract]. (Eng.) Thomas, H. C.; Chadwick, G.; Jain, S.; Sherlock, S. (Royal Free Hosp., Hampstead, London, England). *Digestion* 16(4):358; 1977.

See also, 2961, 3252, 3308, 3316, 3317, 3321.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

3332 ROUTINE DIAGNOSIS AND THERAPY OF FATTY DEGENERATION OF THE LIVER. (Ger.) Gunthner, W.; Dandl, M. (Medicus-Hausl, 8240 Schonau, W. Germany). *Therapiewoche* 27(35):6084-6086, 6089; 1977.

Ten patients with fatty degeneration of the liver were placed on low-carbohydrate diets with abstinance from alcohol and they received betaine citrate (15 g/day during the first month, 7.5 g/day during the following 3 months). Fatty liver, diagnosed bioptically, was due to chronic alcohol abuse in eight cases, and to hyperalimentation in two. Four patients had hepatomegaly before the treatment, and the gamma-glutamyl level, measured in seven cases, was 16-163 U/l. Three patients lost weight considerably, and thus they were assumed to have kept the diet and abstained from alcohol, while these events are questionable in the other cases. The blind liver biopsy performed after the 4-month treatment revealed considerable reduction of the fat incorporation in the liver; the fat content dropped to 10% or less in eight cases. No hepatomegaly was seen. The results of the laboratory tests were largely contradictory, but the gamma-glutamyl level showed a reduction. The findings indicate the value of blind liver biopsy in the follow-up of fatty liver.

3333 HEPATIC MAMMALIAN COLLAGENASE: DEVELOPMENT OF AN ASSAY AND DEMONSTRATION OF INCREASED ACTIVITY AFTER ETHANOL CONSUMPTION [Abstract]. (Eng.) Okazaki, I.; Feinman, L.; Lieber, C. S. (Bronx Veterans Admin. Hosp., Bronx, NY). *Gastroenterology* 73(5):1236; 1977.

3334 ALCOHOLIC LIVER DISEASE (ALD) PRESENTING WITH MARKED HYPERPHOSPHATASEMIA: A COMBINED CLINICAL AND PATHOLOGICAL EVALUATION [Abstract]. (Eng.) Perrillo, R.; Lander, J.; Griffen, R.; DeSchyrver, K.; Zuckerman, G. (Washington Univ. Sch. Medicine, St. Louis, MO). *Gastroenterology* 73(5):1239; 1977.

3335 EFFECT OF PROPYLTHIOURACIL IN TREATMENT OF ALCOHOLIC LIVER DISEASE [Abstract]. (Eng.) Orrego, H.; Kalant, H.; Israel, Y.; Medline, A.; Rankin, J.; Findlay, J.; *et al.* (Addiction Res. Foundation, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 73(5):1237; 1977.

See also, 2642, 2779, 2832, 2961, 3223, 3252, 3254.

LIVER AND BILIARY TRACT

Cirrhosis

3336 ORAL CHOLATE TOLERANCE TEST--AN APPLICATION OF SPECIFIC RADIOIMMUNOASSAYS FOR THE DETERMINATION OF SERUM-CONJUGATED CHOLIC AND DEOXYCHOLIC ACIDS. (Eng.) Matern, S.; Haag, M.; Hans, C.; Gerok, W. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12, October 1976.* (Baltimore, Md.: University Park Press): 253-261; 1977.

The kinetics of serum conjugated cholic and deoxycholic acids were determined using specific radioimmunoassays in an oral cholate tolerance test to investigate the dynamics of the enterohepatic circulation of cholic acid in health and disease. In nine healthy volunteers, cholate administration (0.5 g p.o.) caused an elevation of peripheral serum conjugated cholic acid levels. In 10 cirrhotic patients without portal hypertension, the same dose caused a slightly higher increase of serum conjugated cholic acid than in the healthy volunteers. Cirrhotic patients with portal hypertension, however, had a marked elevation of serum conjugated cholic acid levels within the first hour after p.o. cholate administration. The kinetics of serum conjugated cholic acid in cirrhotic patients with portal hypertension showed a biphasic rise, with the second peak ascribed to the reabsorption of the cholate. The second peak reflects, therefore, a disturbed gallbladder function. In healthy volunteers, there were no changes of serum conjugated deoxycholic acid levels over a 5-hr period; in cirrhotic patients with portal hypertension, a very small part of the cholic acid was metabolized to deoxycholic acid during the enterohepatic circulation as demonstrated by a slight increase of serum conjugated deoxycholic acid levels over a 5-yr period. Changes in the levels of serum bile acids appear to reflect the dynamics of the enterohepatic circulation.

3337 SPLENOPORTOSCINTIGRAPHY: RESULTS IN 213 CASES. (Fre.) Vinot, J. M.; Paraf, A.; Syrota, A.; Desgrez, A. (Centre Hospitalo-Universitaire de Bicetre, F 94270 Le Kremlin Bicetre, France). *Ann. Med. Interne (Paris)* 128(12):917-921; 1977.

Splenoportoscintigraphic tests were performed in 213 patients, including 12 with hepatosplenic diseases, 23 with isolated splenomegaly, 18 with generalized diseases with hepatosplenic involvement, 11 with pancreatic diseases, 124 with cirrhosis (including 2 with biliary cirrhosis), 18 with portacaval shunt, 5 with fibrosteatosis, and 2 with cavernomas. Following the i.v. injection of ^{99m}Tc-labeled colloidal sulfur, the center of the spleen was marked, and ^{99m}Tc-labeled human albumin (1 mCi) and ^{99m}Tc-labeled RBC (12 mCi) were injected into the spleen. The scintigraphic test was a total failure in 8 cases due to the absence of any tracer migration and a partial failure in 13 cases due to the absence of the migration of one tracer. Hemoperitoneum prompted splenectomy 24 hr after the test in one case. In the evaluable cases, it was possible to determine the permeability of the anastomosis in portacaval shunt, and to obtain morphological and hemodynamic data. Umbilical reflux was found in 20/124 cirrhotic patients, and total spontaneous splenocaval shunt was found in 14/124 cases. The findings indicate the value of the splenoporto-scintigraphic test in the diagnosis of morphological and hemodynamic disorders in the portal circulation.

3338 MECHANISM OF HYPOGONADISM IN CIRRHOTIC MALES.

(Eng.) Green, J. R. B. (St. Bartholomew's Hosp., London, England). *Gut* 18(10): 843-853; 1977.

Recent studies on the mechanism of hypogonadism and feminization in cirrhotic males are reviewed. Associated with the clinical signs of hypogonadism and overt feminization in cirrhotic males is a reduced production of testosterone along with a low plasma testosterone concentration. Recent studies have failed to show significant changes in the hepatic metabolism of biologically potent estrogens in cirrhotic men, and there is no clear evidence of increased circulating concentrations of estrogens in cirrhotic men. Alcohol consumption appears to play no specific role in the endocrine changes of established cirrhosis, since these changes are seen equally in nonalcoholic cirrhotics. In noncirrhotic men, both short-term and chronic consumption of alcohol induce a variety of biochemical effects on sex hormone metabolism; many of the endocrine consequences of alcohol consumption in noncirrhotics may result from changes in the hepatic synthesis of sex hormone binding globulin. The pathogenesis of endocrine changes in cirrhotic men may be multifactorial, e.g., a combination of decreased hepatic clearance of some estrogenic compounds, an autoimmune-mediated primary testicular defect, and a specific potentiation effect by alcohol. Alternatively, none of these suggested mechanisms may be of importance, and the endocrine changes seen in cirrhotic males may be mediated by other undiscovered or unconsidered mechanisms.

3339 SERUM POLYAMINE AND OCTOPAMINE CHANGES FOLLOWING PARTIAL HEPATECTOMY AND PORTACAVAL SHUNT.

(Eng.) Monson, R. C.; Rodgers, B. M.; Garnica, A. D.; Talbert, J. L. (Dept. Surgery, Univ. Florida, Gainesville, FL). *J. Pediatr. Surg.* 12(6):1079-1084; 1977.

The effect of portal blood flow on liver regeneration was studied to determine the factors influencing hepatic regeneration following major hepatic resection. An end-to-side portacaval shunt was performed in a 5-yr-old boy to relieve splanchnic congestion resulting from interruption of the portal vein due to complete resection of the right lobe of the liver. Serial liver scans demonstrated that the right lobe was completely regenerated by 6 weeks postoperatively. Throughout the postoperative period, the patient was maintained on a high-protein diet without clinical evidence of hepatic encephalopathy. Serum ammonia and octopamine levels showed early mild elevations (32-90 μg/dl and 1.0-4.0 ng/dl compared to normal values of 18-48 μg/dl and 0.72-1.92 ng/dl, resp.), reaching maxima at 10-12 weeks and returning to normal limits by 20 weeks. Serum polyamine levels provided biochemical evidence of regeneration: an early rise, at 1-4 weeks, in the serum spermidine level (corresponding to the proliferative phase of rapid hepatocyte regeneration) was followed by a large elevation in serum spermine level, which began at 4-5 weeks, and is inversely related to hepatocyte growth and corresponds to the maturation phase of regeneration. The significance of polyamines as regulatory molecules is discussed; they appear to be useful markers for assessing hepatic regeneration. Serial determination of octopamine as an indicator of hepatic encephalopathy is proposed and discussed.

3340 A BALLOON CATHETER TECHNIQUE FOR THE MEASUREMENT OF HEPATIC VEIN WEDGE PRESSURE (HVWP) AND GRADIENT [Abstract].

(Eng.) Groszmann, R. J.; Blei, A.; Kniaz, J.; Storer, E.; Conn, H. O. (Veterans Admin. Hosp., West Haven, CT). *Gastroenterology* 72(5, Part 2):1177; 1977.

3341 CYSTOMETRIC STUDIES IN LIVER CIRRHOSIS [Abstract].

(Eng.) Reddy, A. N.; Grosberg, S. J.; Wapnick, S.; Abrahams, J. (Veterans Admin. Hosp., Brooklyn, NY). *Gastroenterology* 72 (5, Part 2):1117; 1977.

3342 RELATIONSHIP BETWEEN THE HEPATIC SINUSOIDAL PRESSURE AND THE RENIN-ANGIOTENSIN-ALDOSTERONE SYSTEM IN CIRRHOSIS WITH ASCITES [Abstract].

(Eng.) Bosch, J.; Arroyo, V.; Mauri, M.; Mas, A.; Carrilho, F.; Betriu, A.; Rodes, J. (Hospital Clinico y Provincial, Barcelona, Spain). *Digestion* 14(5/6):472-473; 1976.

3343 IDIOPATHIC (HYPERKINETIC) PORTAL HYPERTENSION--THE ARGUMENT FOR EXTRAHEPATIC CAUSE, AND TREATMENT BY SPLENECTOMY [Abstract].

(Eng.) Langer, B.; Taylor, B. R.; Colapinto, R. M. (Dept. Surgery, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1086; 1977.

3344 CORRECTION OF ANTIDIURESIS AND SODIUM RETENTION BY DEMECLOCYCLINE IN PATIENTS WITH INTRACTABLE ASCITES AND OEDEMA [Abstract].

(Eng.) Poupon, R.; Gustot, P.; Darnis, F. (Hopital Saint-Antoine, Paris, France). *Digestion* 14 (5/6):472; 1976.

3345 ASSESSMENT OF THE RISK OF PORTACAVAL ANASTOMOSIS IN LIVER CIRRHOSIS [Abstract].

(Eng.) Gauthier, A.; Cros, R. C.; Assadourian, R.; Di Costanzo, J. (Hopital Sainte-Marguerite, Marseille, France). *Digestion* 15(5):A440-A441; 1977.

3346 A PROSPECTIVE RANDOMIZED TRIAL OF THE DISTAL SPLENORENAL (WARREN) SHUNT--A PRELIMINARY REPORT [Abstract]. (Eng.) Langer, B.; Patel, S.; Stone, R. M. (Dept. Surgery, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1086; 1977.

3347 A DOUBLE-BLIND CONTROLLED STUDY USING D-PENICILLAMINE IN CHRONIC CHOLANGIOLITIC HEPATITIS (PRIMARY BILIARY CIRRHOSIS) [Abstract]. (Eng.) Dickson, E. R.; Fleming, C. R.; Geall, M. G.; McCall, J. T.; Baggenstoss, A. H. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2): 1049; 1977.

3348 SUPPLEMENTAL VITAMIN A IN CIRRHOTICS: REVERSAL OF ABNORMAL DARK ADAPTATION AND EFFECTS ON THE RETINOL TRANSPORT SYSTEM [Abstract]. (Eng.) Russell, R. M.; Morrison, S. A.; Smith, F. R. (Veterans Admin. Hosp., Baltimore, MD). *Gastroenterology* 72(5, Part 2):1124; 1977.

3349 ASSESSMENT OF MORPHOLOGIC RESPONSE TO 25-OH VITAMIN D (25-OH D) THERAPY IN PATIENTS WITH PRIMARY BILIARY CIRRHOSIS (PBC) [Abstract]. (Eng.) Reed, J. S.; Meredith, S. C.; Nemchausky, B. A.; Rosenberg, I. H.; Boyer, J. L. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Gastroenterology* 72(5, Part 2):1181; 1977.

3350 INTESTINAL ABSORPTION OF 25-HYDROXYVITAMIN D AND OSTEOMALACIA IN PRIMARY BILIARY CIRRHOSIS [Abstract]. (Eng.) Compston, J.; Thompson, R. P. H. (St. Thomas' Hosp., London, England). *Gut* 18(5):A401; 1977.

3351 ABNORMAL VITAMIN D METABOLISM IN CIRRHOSIS [Abstract]. (Eng.) Jung, R. T.; Davie, M.; Hunter, J. O.; Chalmers, T. M. (Addenbrooke's Hosp., Cambridge, England). *Gut* 18(5):A401; 1977.

See also, 2916, 2939, 2960, 2961, 3155, 3252, 3257, 3289, 3298, 3327.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

3352 COMPLICATIONS OF ENDOSCOPIC SPHINCTEROTOMY. (Eng.) Liguory, C.; Girault, F.; Coffin, J. C. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, France, 8-9 June 1976.* (Basel: S. Karger): 232-239; 1977.

Complications of endoscopic sphincterotomy encountered in several series of patients are discussed. Hemorrhage is the chief complication of this procedure, occurring in 24/624 operations in three separate series. Acute pancreatitis represents 1.6% of complications of endoscopic sphincterotomy. Two kinds of infectious complications may occur: cholangitis and cholecystitis (when the gallbladder has been left). Perforation, generally retroperitoneal, was seen in 1.2% of cases. Blocking was observed in three cases and resulted from an insufficiently large sphincterotomy for the size of the stone. Although insufficient time has elapsed since the introduction of this technique to evaluate later complications, two risks are considered possible, secondary papillary stenosis and duodenal-biliary reflux. Some mishaps occurring with surgical sphincterotomy do not occur with endoscopy, e.g., complications associated with general anesthesia and surgery. Acute pancreatitis occurs after endoscopic sphincterotomy but is much less severe than after surgery. It is concluded that the risks of endoscopic sphincterotomy should not overshadow its benefits.

3353 EXPERIENCE WITH ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATICOGRAPHY. (Nor.) Ruud, T. E.; Rosseland, A.; Thorsen, G. (Telemark Sentralsjukehus, Kirurgisk avdeling, Skien, Norway). *Tidsskr. Nor. Laegeforen.* 97(33):1732-1735; 1977.

Experience with endoscopic retrograde cholangiopancreaticography (ERCP), performed in 133 patients on 155 occasions, is presented. Cannulation of the ampulla of Vater and contrasting of at least one duct system was possible in 89% of all cases. Cannulation was not possible in 29 cases, because the ampulla was not found, it was hidden in a duodenal diverticulum, or destroyed by tumor infiltration. Postcholecystectomy syndrome; suspect tumor of the bile ducts, pancreas, or duodenum; papillotomy, extrahepatic cholestatic jaundice; and examination after pancreatitis were the indications for ERCP. It was possible to visualize the pancreas in 85%, the bile ducts in 82%, and both systems in 70% of the cases. During visualization of the common bile duct, stone in the common bile duct was found in 21 cases, stone in the gallbladder in 9, dilated bile ducts in 30, stricture in 9, and no change in 34. The pancreas, visualized in 61 cases, showed chronic pancreatitis in 11 cases, pancreatic tumor in 5, tumor in the region of the ampulla of Vater in 1, and no change in 44 cases. The complications of ERCP occurred in 5% of the cases and included mild pancreatitis (3 cases), cholangitis (2), cardiac infarction (1), and fatal perforation of the common bile duct (1). ERCP was most useful in extrahepatic cholestasis. The examination helped establish the indication of surgery or spare the patient from surgery. A remarkably high incidence of pathological processes was found in patients with duodenal diverticulum. The findings indicate the great diagnostic value of ERCP.

3354 CLINICAL INVESTIGATIONS ON THE CHOLERETIC FEBUPROL. (Ger.) Scholing, W. E.; Weinert, W. (Kreuzbergpromenade 13 A, A-5020 Salzburg, Austria). *Munch. Med. Wochenschr.* 120(5):143-146; 1978.

The choleretic agent Febuprol (3-butoxy-1-phenoxy-propanol-[2]) was studied in 50 outpatients with cholecystopathy in a double-blind cross-over trial. Postcholecystectomy syndrome was diagnosed in 43 patients, chronic cholecystitis in 5, and cholecystopathy of unknown genesis in 2. Some patients received three capsules daily for 14 days, others received placebo, after which the drugs were switched. The therapeutic effectiveness was evaluated on the basis of a grade system, using feeling of fullness, pressure in the upper abdomen, meteorism, obstipation, flatulence, and postprandial nausea as criteria. The reduction of the intensity of these symptoms ranged from 0% (postprandial nausea) to 21.7% (flatulence) in the placebo group, while it ranged from 21.4% (meteorism) to 83.3% (postprandial nausea) in the Febuprol-treated group. The differences were statistically significant ($p<0.01$-0.05). The findings indicate the therapeutic effectiveness of Febuprol in cholecystopathy.

3355 GALLSTONE DISEASE: PATHOGENESIS AND MANAGEMENT. (Eng.) Shaffer, E. A.; Small, D. M. (McGill Univ., Montreal, Canada). *Curr. Probl. Surg.* 13(7):1-72; 1976.

The pathogenesis and treatment of gallstone disease, which accounts for 5,000-8,000 deaths per year, is reviewed. Gallstones are definitely associated with certain clinical factors such as pancreatitis, carcinoma of the gallbladder, chronic ileal disease, and obesity. Probable associations have been established for diet, atherosclerosis, hyperlipidemia, diabetes mellitus, peptic ulcer, and gastric surgery. There are two classes of gallstones, cholesterol and bile pigment gallstones. Pigment gallstones may be formed by secretion of an abnormal pigment that readily precipitates in bile, excessive hepatic secretion of a normal pigment that surpasses its solubility in bile, or extrahepatic conversion of a normal constituent into an insoluble precipitate. There are at least six categories of pathophysiologic abnormalities that can lead to abnormal bile and ultimately to cholesterol gallstones: 1) excessive bile salt loss, 2) oversensitive bile acid feedback, 3) excessive cholesterol secretion, 4) rapid bile salt circulation with decreased pool size, 5) a mixed defect that is a combination of types 1 and 2, and 6) primary disorders of the gallbladder, ducts, or sphincters. The definitive treatment of gallstones is surgery, but therapeutic agents are being used (chenodeoxycholic acid, phenobarbital) and actively investigated (lecithin, α-glycerophosphate).

3356 DISTURBANCES IN GASTRIC EMPTYING IN GALLSTONE PATIENTS. (Ger.) Otten, G.; Helwing, E.; Lux, M. (Klinik fur Allgemeinchirurgie, Medizinische Hochschule, Podbielskistrasse 380, D-3000 Hannover 51, W. Germany). *Wien. Med. Wochenschr.* 127(24):741-742; 1977.

Gastric emptying was studied in 35 patients with cholelithiasis during symptom-free intervals. Gastric juice analysis revealed normal values in all cases. Gastric emptying was assessed from the exhalation of radioactive carbon dioxide following the administration of a test meal (low-fat cottage cheese mixed with ^{14}C-labeled glutaminic acid, 15 μCi). The $^{14}CO_2$ exhalation was significantly higher in normal subjects than in the patients with cholelithiasis (4,000-5,000 counts/min versus about 2,000 counts/min, resp.). These changes are interpreted as an expression of disturbances in gastric motor functioning. The findings indicate retarded gastric emptying in patients with cholelithiasis even during asymptomatic intervals.

3357 CHOLELITHIASIS IN CHILDREN AND ADOLESCENTS. (Ger.) Gotz, M.; Granditsch, G.; Helmer, F.; Howanietz, L.; Wagner, I. U. (Universitats-Kinderklinik Wien, Wahringer Gurtel 74-76, A-1090 Vienna, Austria). *Wien. Klin. Wochenschr.* 89(20): 686-690; 1977.

Cholelithiasis was found in 10 children and adolescents (2 boys, 8 girls, aged 11-20 yr) during a 19-yr-period. The length of the anamnesis ranged from 5 days to 6 yr, averaging about 2 yr. The symptoms included abdominal pains and disorders in all cases, tenderness in the right upper quadrant in eight, and jaundice in four. Predisposing conditions were found in five cases: spherocytosis in three and familial cholecystopathy in two. The serum bilirubin level, determined in nine cases, was in the normal range in six. The other laboratory tests were not conclusive. Cholelithiasis was diagnosed by x-raying in six cases, and by oral cholecystography or i.v. cholangiography in the others. Cholecystectomy was performed in all cases; the postoperative course was uneventful in nine cases, one patient developed localized peritonitis. Multiple gallstones and signs of chronic cholecystitis were found in all cases. Cholecystectomy should be performed in all gallstone patients, even in the absence of symptoms.

3358 PROGRESS REPORT: NON-SURGICAL REMOVAL OF COMMON BILE DUCT STONES. (Eng.) Classen, M.; Ossenberg, F. W. (General Hosp. Hamburg-Barmbek, Rubenkamp 148, D 2000 Hamburg 60, W. Germany). *Gut* 18(9):760-769; 1977.

Common bile duct stones that have been overlooked during surgery may be disclosed after operation by cholangiographic follow-up examinations via the T-tube. The T-tube permits probes and snares to be introduced to remove the stones mechanically under radiological or endoscopic control. It also allows the stones to be irrigated with a solvent for cholesterol (cholic acid being commonly used) or with substances that permit them to be fragmented, e.g., heparin. The removal of common bile duct stones has also been performed using endoscopic papillotomy. Of the more than 1,100 endoscopic papillotomies performed for the removal of stones in the common bile duct, 89% were successful. Complications such as pancreatitis, perforation, bleeding, and septic cholangitis were observed in 94/1,107 patients. The risk of septic cholangitis increased with the size and eventual impaction of the common duct stone; the risk of bleeding seemed to be correlated with the length of the incision and the size of the stone. Indications for endoscopic papillotomy are isolated papillary stenosis, common bile duct stones that were overlooked during surgical operations or are newly formed, and stones with symptoms of obstruction in patients at high risk for surgery.

3359 DIFFERENCES IN RENAL EXCRETION BETWEEN GLYCO-, TAUROCONJUGATES, SULFOCONJUGATES AND GLUCURONOCONJUGATES OF BILE ACIDS IN CHOLESTASIS. (Eng.) Back, P.; Gerok, W. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 93-100; 1977.

The renal excretion of bile acids was studied in 109 patients. Bile acid conjugates were separated into three major groups: glyco-, tauroconjugates, sulfoconjugates, and glucuronoconjugates. Within these groups, the six major bile acids occurring in plasma and urine were determined separately. The glyco-, tauroconjugates were excreted into urine up to limit values, which were not surpassed even at high plasma concentrations. Excretion of sulfoconjugates, however, correlated linearly with plasma concentration, making it possible to calculate clearance values for these derivatives, which approximate maximum rates. This finding may also be true for glucuronoconjugates of chenodeoxycholic acid and 3β-hydroxy-5-cholenoic acid, if larger numbers of patients are being investigated. Based on the differences of renal clearances of the different groups of conjugates, it is hypothesized that bile acids enter the urine by diffusion processes only.

3360 LONG-TERM RESULTS OF PAPILLOSTOMY. (Eng.) Stefanini, P.; Carboni, M.; De Bernardinis, G.; Negro, P. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, France, 8-9 June 1976.* (Basel: S. Karger): 206-212; 1977.

A follow-up study was conducted on 577 patients who had had a papillostomy (sphincteroplasty) at least 1 yr before to determine the therapeutic long-term results of the procedure. The indications for surgery had been common duct lithiasis (338), secondary papillitis (193), primary papillitis (34), and chronic pancreatitis (12). The study was conducted by questionnaire and, in 160 cases, by clinical examination also. Good results, i.e., absence of symptoms of pain or dyspepsia relative to the biliary tract or pancreas, were obtained in 97% of the patients. The pathological conditions causing failures (17) were residual or recurrent stones (9 cases), papillary stenosis (6), cholangitis from reflux (1), and chronic recurrent pancreatitis (1). A number of the failures were caused by operating for the wrong indications. However, these mistakes were made 10 yr ago, when the diagnostic methods that today markedly reduce the incidence of wrong indications for operation were not available. It is concluded that papillostomy, performed with the correct indications, can cure the condition for which it is applied.

3361 BILIRUBIN METABOLISM AND JAUNDICE. (Eng.) Robinson, S. H. (Beth Israel Hosp., Boston, MA). *Pathobiol. Annu.* 6:299-316; 1976.

Normal and defective pathways of bilirubin metabolism are reviewed. Hyperbilirubinemia may be caused either by overproduction or impaired excretion of bilirubin. The most common cause of over-production jaundice is an increased rate of hemoglobin catabolism in hemolytic disorders. An increase in the erythropoietic bilirubin fraction occurs under two conditions: 1) with physiologically regulated erythroid hyperplasia and 2) with pathologic ineffective erythropoiesis (destruction of immature erythroid cells in or soon after leaving the marrow). Causes of impaired bilirubin excretion include defects in hepatic uptake, conjugation, secretion, and/or canalicular function, and extrahepatic obstruction. In acute hepatitis and chronic liver disease, multiple defects in bilirubin metabolism and excretion contribute to hyperbilirubinemia. Despite multiple reasons for unconjugated hyperbilirubinemia, a large portion of the serum bilirubin is typically of the conjugated type in patients with acquired liver damage. This finding appears to be a result of the vulnerability to injury of the secretory pathway as well as obstruction of bile radicles by architectural distortion and edema.

3362 PRIMARY AND SECONDARY CHRONICAL ODDITIS. (Eng.) Laurent, J.; Floquet, J.; Guibal, F.; Watrin, B.; Vosse, A. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, France, 8-9 June 1976.* (Basel: S. Karger): 131-136; 1977.

The diagnosis and treatment of chronic odditis is discussed. Odditis is defined as any state of obstruction of the choledocho-Wirsung junction in conjunction with anatomic fiber inflammation of the papilla and Oddi's sphincter. Cases of primary odditis are extremely rare, found in conjunction with pancreatitis or, more frequently, with lithiasis. Clinical observation, pressure tests, and radiography are necessary for diagnosis; the symptoms are presence of biliary pain and, sometimes, presence of jaundice. Pressure tests are mainly carried out during the operation, but duodenoscopy now makes it possible to perform miniaturized pressure tests without surgery. Radiographic indications of odditis are: 1) dilatation of the main biliary duct, 2) absence of evacuation, and 3) absence of Oddi movement. The last sign is the most reliable and can be studied better by using radiocinema than by conventional radiography. Medical treatment is reserved to cases of anorganic Oddi hypertonicity without lithiasis. Surgery should be used only on rare occasions. An elementary dilatation without duodenotomy may frequently be sufficient. Endoscopic sphincterotomy should be reserved to odditis after cholecystectomy with or without choledocholithiasis.

3363 SIGNIFICANCE OF DEBRAY'S TEST (CHOLERETIC MORPHINE TEST) AND SIMULTANEOUS ENZYME TESTS IN THE DIAGNOSIS OF DYSKINESIA OF THE SPHINCTER OF ODDI. (Hun.) Szollosi, G.; Pap, A.; Dobronte, Z.; Varro, V. (I. Belgyogyaszati Klinika, Szegedi Orvostudomanyi Egyetem, Szeged, Hungary). *Orv. Hetil.* 119(3):139-141; 1978.

The diagnostic value of the choleretic morphine test (Debray's test) was studied in 89 patients with dyskinesia of the hypertonic sphincter of Oddi. Fifty-seven patients had undergone cholecystectomy several years previously. The SGOT, gamma-glutamyl transpeptidase (gamma-GT), and serum and urine diastase levels were also determined before and 1-6 hr after the test in 72 patients. Twenty-eight of the 57 cholecystectomized patients were found to be Debray-positive, and 27 were Debray-negative; the test was not evaluable in 2 patients. Positive tests were found in 3 of the 32 noncholecystectomized patients, 2 tests were not evaluable, and the other was negative. The SGOT level increased from 24 to 73 U in the Debray-positive patients 4 hr after the test, but no such increase was seen in the cholecystectomized, Debray-negative patients. The incidence of pathological SGOT changes was 1/26 in the noncholecystectomized Debray-negative patients, 8/21 in the cholecystectomized Debray-negative patients, and 15/25 in the Debray-positive patients. The gamma-GT and serum and urine diastase tests furnished no diagnostically relevant information. The findings indicate that the combination of Debray's test with the SGOT test is more reliable in the diagnosis of dyskinesia of the hypertonic sphincter of Oddi than is Debray's test alone.

3364 TRANSDUODENAL DILATATION OF THE SPHINCTER AND ITS RISKS. (Ger.) Schmidt, H. D.; Brunner, H.; Wendling, P. (Chirurgische Universitatsklinik Mainz, D-65 Mainz, W. Germany). *Wien. Med. Wochenschr.* 127(24):743-744; 1977.

Experience with transduodenal dilatation (bougienage) of the ampulla of Vater in 795 cases is presented. Ten patients developed complications; four had perforation of the choledochus, two had stenosis of the ampulla of Vater, three had pancreatitis, and a small tumor of the ampulla was overlooked in another. There was no postoperative mortality. If difficult probing occurs, the ampulla should always be exposed by laparotomy. The findings indicate that transduodenal dilatation of the ampulla of Vater is a fairly low-risk intervention, if it is performed for the proper indications.

3365 COMPLICATIONS OF SPHINCTEROTOMY. (Eng.) Mercadier, M.; Clot, J. P.; Chigot, J. P.; Hermant, C. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, France, 8-9 June 1976.* (Basel: S. Karger): 196-200; 1977.

Complications of sphincterotomy in 109 cases are considered along with those in several series reported in the literature. The percentage of sphincterotomies in relation to gallstones was 10% and in relation to stones in the common duct was 40%; these figures are lower than those published by previous authors. The most serious postoperative complication was acute pancreatitis. It was responsible for one death (confirmed at autopsy) and possibly for another, giving a maximum mortality rate due to pancreatitis of 1.8%, which is very close to that reported in other series. However, acute pancreatitis represents a relatively rare complication of sphincterotomy and has also been seen after simple cholecystectomy or bilio-intestinal anastomosis. With respect to postoperative morbidity, the following were seen: two abdominal dehiscences, one leakage of bile, one duodenal fistula, and two subphrenic abscesses, none of which could be imputed to the operative procedure. It is concluded that the procedure is associated with neither greater morbidity nor mortality than other operations involving the main bile ducts. Sphincterotomy is an essential procedure, but it should not be carried out on a routine basis.

3366 BENIGN STRICTURES OF THE TERMINAL COMMON BILE DUCT: PATHOLOGICAL AND SURGICAL CONSIDERATIONS. (Eng.) Fernandez-Cruz, L.; Palacin, A.; Pera, C. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, France, 8-9 June 1976.* (Basel: S. Karger): 137-144; 1977.

In an effort to understand the pathological substratum of stenosis to gain greater precision of diagnostic terminology and to better assess the need for sphincterotomy, a histological study was conducted on specimens obtained by operative biopsy after sphincterotomy in 51 patients (44 women and 7 men) and the results compared with preoperative cholangiographic data. The following conditions were observed: 1) alterations of the glandular system (13 cases), 2) diffuse fibrosis (11 cases), 3) alterations of the glands with inflammatory component (10 cases), 4) inflammatory infiltration (11 cases), and 5) pancreatic heterotopia with fibrosis (2 cases). Among the cases of biliary lithiasis studied, choledocholithiasis was present in 68% and lithiasis of the gallbladder in 31.8%. Benign stricture of the terminal common bile duct was diagnosed by preoperative cholangiogram but the lesion type is unidentifiable until after the sphincterotomy has been performed.

3367 THE GALLBLADDER AS BILIARY CONDUIT IN NON-RESECTABLE EXTENSIVE ACALCULOUS EXTRAHEPATIC DUCTAL OBSTRUCTION. (Eng.) Feuchtwanger, M. M. (Dept. Surgery, Ben Gurion Univ., Beersheba, Israel). *Chir. Gastroenterol.* 11(2):243-247; 1977.

3368 BILE PERITONITIS AND BILIARY TUBERCULOSIS: A CASE REPORT. (Eng.) Heydenrych, J. J.; Du Toit, D. F. (Tygerberg Hosp., Parowvallei, Cape Town, South Africa). *S. Afr. Med. J.* 52(14):580-582; 1977.

3369 SILK SUTURES IN THE COMMON BILE DUCT. (Eng.) Rees, B. I.; Jacob, G. (Univ. Hosp. Wales, Cardiff, Wales). *Br. Med. J.* 2(6097): 1265; 1977.

3370 EVALUATION OF CHOLESTATIC JAUNDICE BY COMPUTED TOMOGRAPHY. (Eng.) DiGiacomo, P. J., Jr.; Laborda, O. E.; Stein, G. N.; Sheer, G. W., III; Herrera, A. F. (Presbyterian-Univ. Pennsylvania Medical Center, Philadelphia, PA). *Surg. Gynecol. Obstet.* 145(4):570-572; 1977.

3371 CHOLELITHIASIS AND HORMONAL THERAPY. (Eng.) Weiss, G. N.; Weiss, E. B. (Dept. Surgery, Louisiana State Univ., New Orleans, LA). *Abdom. Surg.* 19(9):203-205; 1977.

3372 ADVANCED HYPERBILIRUBINEMIA SIMULATING OBSTRUCTIVE JAUNDICE AFTER CHOLEDOCHOLITHOTOMY: REPORT OF A CASE. (Eng.) Bergqvist, D.; Hallbook, T. (Karnsjukhuset, Skovde, Sweden). *Acta Chir. Scand.* 143(4):245-248; 1977.

3373 RESIDUAL BILIARY TRACT STONES: NONOPERATIVE TREATMENT OF 570 PATIENTS. (Eng.) Mazzariello, R. M. (Rivadavia Hosp., Buenos Aires, Argentina). *Surg. Annu.* 8:113-144; 1976.

3374 MANOMETRIC EVALUATION OF SURGICAL SPHNICTEROPLASTY OF THE ODDI [Abstract]. (Eng.) Guelrud, M.; Plaza, J.; Roa, E.; Zambrano, V.; Beker, S. (Escuela de Medicina, Universidad Central de Venezuela, Caracas, Venezuela). *Gastroenterology* 72(5, Part 2):1066; 1977.

3375 DUODENOSCOPIC MANOMETRY OF THE BILE DUCT AND SPHINCTER OF ODDI [Abstract]. (Eng.) Ribeiro, B. F.; Cotton, P. B.; Dilawari, J. B.; Roberts, M.; Laurence, B. (Middlesex Hosp., London, England). *Gut* 18(5):A407; 1977.

3376 ENDOSCOPIC SPHINCTEROTOMY OF THE PAPILLA OF VATER [Abstract]. (Eng.) Classen, M.; Wurbs, D.; Hagenmuller, F. (Allgemeines Krankenhaus Barmbek, Rubenkamp 148, D-2000 Hamburg 60, W. Germany). *Gut* 18(5):A399; 1977.

3377 ANOMALOUS POSITION OF THE GALL-BLADDER: WITHIN THE LESSER SAC THROUGH THE EPIPLOIC FORAMEN. (Eng.) Yamasaki, M.; Sato, T. (Niigata Univ. Sch. Medicine, Niigata, Japan). *Acta Med. Biol. (Niigata)* 24(1):37-45; 1976.

3378 EXTRAHEPATIC BILIARY ATRESIA: AETIOLOGICAL, CLINICAL AND MANAGEMENT CONSIDERATIONS [Abstract]. (Eng.) Mowat, A. P.; Psacharopoulos, L. (No affiliation given). *Acta Paediatr. Belg.* 29(2):134; 1976.

3379 TUMOROUS CONDITIONS OF THE GALLBLADDER. (Eng.) Melson, G. L.; Reiter, F.; Evens, R. G. (Washington Univ. Sch. Medicine, 510 S. Kingshighway, St. Louis, MO 63110). *Semin. Roentgenol.* 11(4):269-282; 1976.

3380 EARLY DIAGNOSIS OF CANCER OF THE PAPILLA OF VATER [Abstract]. (Eng.) Davies, R. S.; Ho, C. S.; Langer, B.; Phillips, J. M.; McHattie, J. D. (Toronto General Hosp., Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1044; 1977.

3381 CHRONIC CHOLECYSTITIS AND CHOLELITHIASIS. (Eng.) Palayew, M. J. (Jewish General Hosp., 3755 Cote St., Catherine Rd., Montreal, Canada). *Semin. Roentgenol.* 11(4):249-257; 1976.

3382 ORAL PHOSPHOLIPIDS AND PHOSPHOLIPID PRECURSORS FAIL TO ALTER BILIARY LIPIDS IN CHOLELITHIASIS [Abstract]. (Eng.) Holan, K. R.; Holzbach, R. T. (Cleveland Clinic Foundation, Cleveland, OH). *Gastroenterology* 72(5, Part 2):1070; 1977.

3383 CHEMICAL FACTORS INVOLVED IN CHOLESTEROL GALLSTONE FORMATION--POSSIBLE PREVENTION AND MEDICAL MANAGEMENT. (Eng.) Navarro, M. D.; Guevara, B. Q. (Univ. Santo Tomas Res. Center, Philippines). *Acta Manilana* 15(24):25-33; 1976.

3384 GALLSTONE COMPOSITION: CENTER VS PERIPHERY OF CHOLESTEROL OR PIGMENT GALLSTONES [Abstract]. (Eng.) Williamson, C. E. (Sch. Medicine, Univ. Pennsylvania, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1150; 1977.

3385 REDUCTION IN LITHOCHOLIC AND DESOXYCHOLIC ACID IN BILE AND FECES DURING CLINDAMYCIN [Abstract]. (Eng.) Knipp, J. E.; Aroesty, S.; Flood, M. S.; Faloon, W. W. (Highland Hosp., Rochester, NY). *Gastroenterology* 72(5, Part 2):1081; 1977.

3386 CHENIC ACID IN GALLSTONE PATIENTS: EFFECT OF LOW CHOLESTEROL AND OF HIGH PLANT STEROL DIETS [Abstract]. (Eng.) Maudgal, D. P.; Bird, R.; Enyobi, V. O.; Blackwood, W. S.; Northfield, T. C. (St. George's Hosp. Medical Sch., London, England). *Gut* 18(5):A419; 1977.

3387 MEDIUM CHAIN GLYCERIDES RAPIDLY DISSOLVE CHOLESTEROL GALLSTONES IN VITRO [Abstract]. (Eng.) Thistle, J. L.; Carlson, G. L.; Hofmann, A. F.; Babayan, V. K. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1141; 1977.

3388 PLANT STEROLS INCREASE EFFECTIVENESS OF CHENODEOXYCHOLIC ACID THERAPY IN LOWERING CHOLESTEROL SATURATION OF FASTING STABLE BILE IN PATIENTS WITH RADIOLUCENT GALLSTONES [Abstract]. (Eng.) Tangedahl, T. N.; Matseshe, J. W.; Thistle, J. L.; Hofmann, A. F. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1138; 1977.

3389 VERY LOW DOSE ORAL CHENODEOXYCHOLIC ACID (CDCA) WILL PRODUCE NON LITHOGENIC BILE AND DISSOLVE GALLSTONES [Abstract]. (Eng.) Danzinger, R. G. (Dept. Surgery, Univ. Manitoba, Winnipeg, Manitoba, Canada). *Gastroenterology* 72(5, Part 2):1042; 1977.

3390 CHIMPANZEES SULFATE LITHOCHOLATE: COMPARATIVE TOXICOLOGICAL STUDIES RELEVANT TO THE SAFETY OF CHENODEOXYCHOLIC ACID THERAPY FOR GALLSTONES [Abstract]. (Eng.) Hofmann, A. F.; Schwenk, M.; Greim, H.; Carter, J. A.; Carlson, G. L. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1070; 1977.

3391 FAILURE OF CHENODEOXYCHOLIC ACID (CDCA) TO REVERSE BILE SUPERSATURATION IN OBESE SUBJECTS ON WEIGHT MAINTENANCE [Abstract]. (Eng.) Mok, H. Y. I.; Crouse, J.; Grundy, S. M. (Dept. Medicine, Univ. California, San Diego, CA). *Gastroenterology* 72(5, Part 2):1104; 1977.

3392 NOVEL PHYSICAL-CHEMICAL PROPERTIES OF URSODEOXYCHOLIC ACID (UDCA) AND ITS CONJUGATES: RELEVANCE TO GALLSTONE DISSOLUTION IN MAN [Abstract]. (Eng.) Carey, M. C.; Mazer, N. A.; Benedek, G. B. (Peter Bent Brigham Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1036; 1977.

3393 EXPANDED BILE ACID POOL AND REDUCED LITHOGENIC POTENTIAL OF BILE AFTER VAGOTOMY [Abstract]. (Eng.) Duane, W. C.; Stempel, J. M. (Veterans Admin. Hosp., Minneapolis, MN). *Gastroenterology* 72(5, Part 2):1051; 1977.

3394 HEPATIC CHOLESTEROL SYNTHESIS: A DETERMINANT OF CHOLESTEROL SECRETION IN GALLSTONE PATIENTS [Abstract]. (Eng.) Key, P. H.; Bonorris, G. G.; Coyne, M. J.; Taub, M.; Schoenfield, L. J. (Cedars-Sinai Medical Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1182; 1977.

3395 DL-284, A BILE-ACID AND CHOLESTEROL-SEQUESTERING RESIN, HAS A DUAL BENEFICIAL EFFECT ON BILIARY LIPID COMPOSITION [Abstract]. (Eng.) Soloway, R. D.; Balistreri, W. F. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1182; 1977.

3396 CHOLANGIOGRAPHIC ABNORMALITIES IN PERICHOLANGITIS: A SPECTRUM OF BILE DUCT INVOLVEMENT [Abstract]. (Eng.) Blackstone, M. O.; Nemchausky, B. A. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Gastroenterology* 72(5, Part 2):1030; 1977.

3397 PHENOBARBITAL THERAPY IN INTRAHEPATIC AND EXTRAHEPATIC CHOLESTASIS IN ADULTS: A RANDOMIZED TRIAL [Abstract]. (Eng.) Metreau, J. M.; Lecompte, Y.; Arondel, J.; Dhumeaux, D. (Service d'Hepatogastroenterologie, Hopital Henri-Mondor, 94010 Creteil, France). *Digestion* 15(5):442-443; 1977.

3398 DIFFERENCES IN HEPATIC ORGANIC ANION CLEARANCES BETWEEN TWO GROUPS OF ASYMPTOMATIC PATIENTS WITH BENIGN RECURRENT CHOLESTASIS (BRC) [Abstract]. (Eng.) van Berge Henegouwen, G. P.; Ferguson, D. R.; Hofmann, A. F.; de Pagter, A. G. F.; Brandt, K. H. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1167; 1977.

3399 COMPARISON OF CT BODY SCANS AND ULTRASONOGRAMS IN THE SEARCH FOR BILIARY DUCTAL DILATION IN PATIENTS WITH JAUNDICE [Abstract]. (Eng.) Goldberg, H. I.; Korobkin, M.; Filly, R.; Moss, A. A. (Dept. Radiology, Univ. California, San Francisco, CA). *Gastroenterology* 72(5, Part 2):1063; 1977.

3400 EVALUATION OF ERC AND PTC IN PATIENTS WITH SUSPECTED OBSTRUCTIVE JAUNDICE [Abstract]. (Eng.) McKnight, W. D.; Shah, S. M.; Jones, S. A.; Greenway, C. D.; Nagai, N.; White, W. D.; *et al.* (Univ. Arkansas for Medical Sciences, Little Rock, AR). *Gastroenterology* 72(5, Part 2):1100; 1977.

3401 COMPARISON OF HEPATIC SCINTISCANNING AND GREYSCALE ULTRASONOGRAPHY IN THE DIAGNO-

SIS OF CHOLESTATIC JAUNDICE [Abstract]. (Eng.) Farthing, M. J. G.; Wraight, E. P.; Tudor, J.; Hunter, J. O. (Addenbrooke's Hosp., Cambridge, England). *Gut* 18(5):A417-A418; 1977.

3402 AMPULLARY STENOSIS: CLINICAL PRESENTATION, DIAGNOSIS AND MANAGEMENT [Abstract]. (Eng.) Raskin, J. B.; Kaplan, S.; Kafka, E. (Univ. Miami Sch. Medicine, Miami, FL). *Gastroenterology* 72(5, Part 2):1116; 1977.

See also, 2642, 2648, 2788, 2803, 2815, 2938, 2957, 2958, 2959, 2969, 2975, 3015, 3116, 3142, 3155, 3161, 3221, 3254, 3276, 3425, 3426, 3434, 3464.

GENERAL

3403 GLUTEN-FREE DIET IN DERMATITIS HERPETIFORMIS: I. CLINICAL RESPONSE OF SKIN LESIONS IN 80 PATIENTS. (Eng.) Reunala, T.; Blomqvist, K.; Tarpila, S.; Halme, H.; Kangas, K. (Univ. Central Hosp., Snellmaninkatu 14, SK-00170 Helsinki 17, Finland). *Br. J. Dermatol.* 97(5):473-480; 1977.

The results of therapy with a gluten-free diet (GFD) for dermatitis herpetiformis in 81 patients were compared with those in 49 dermatitis herpetiformis patients on a normal diet. The 81 patients received a GFD for 6 to 36 months. At the end of treatment, the daily requirement of dapsone was significantly lower in patients treated with a GFD than in the 49 patients on a normal diet ($p<0.001$); the mean daily dose in the GFD group was 92 ± 53 mg before treatment and 37 ± 38 mg after treatment, while in the group on the normal diet, the mean daily dose remained practically unaltered and was 87 ± 44 mg at the end of the study. Ninety-three percent of the patients on a GFD were able to reduce the dose of dapsone, whereas only 16% of the patients on a normal diet were able to do this. Complete remissions occurred only in patients on a GFD. Twenty-eight percent of the patients on a GFD were able to stop dapsone completely and were continuously asymptomatic when they observed a strict diet. A response to a GFD was noted on the mean daily requirement of dapsone as soon as the treatment was initiated, although the length of time for an individual response varied. After 1 yr on a GFD, the patients needed an average about 40% and after 3 yr about 20% of the dose required to control skin symptoms at the beginning of the diet. The patients responded to a GFD irrespective of changes found in the jejunal mucosa and irrespective of the presence or absence of histocompatibility locus antigen-B8.

3404 DERMATITIS HERPETIFORMIS: A COMPARATIVE ASSESSMENT OF SKIN AND BOWEL ABNORMALITY. (Eng.) Cooney, T.; Doyle, C. T.; Buckley, D.; Whelton, M. J. (St. Finbarr's Hosp., Cork, Ireland). *J. Clin. Pathol.* 30(10):976-980; 1977.

To determine whether there is a correlation in severity between the lesions of dermatitis herpetiformis in the skin and in the small bowel mucosa, 18 patients with a clinical diagnosis of dermatitis herpetiformis who were being treated with dapsone and were on an unrestricted diet were studied. The diagnosis was confirmed by finding IgA deposits in the dermal papillae of unaffected skin. Dapsone was discontinued, and biopsy of affected skin was carried out when the typical rash reappeared. The biopsy findings were graded according to the severity of the histological changes. Small bowel tissue from each patient was examined and graded by stereo- and routine microscopy. Thirteen specimens were stereo-microscopically abnormal; all 18 showed villous atrophy, either partial or subtotal; and in 13 the interepithelial lymphocyte count was increased. No correlation was found between the histological severity of the skin and the small bowel lesions. The severity of the skin rash in dermatitis herpetiformis is apparently no guide to the degree of small bowel abnormality.

3405 THERAPEUTIC EXPERIENCE WITH IMODIUM® (LOPERAMIDE), A NEW ANTIDIARRHEAL AGENT. (Ger.) Geginat, G.; Palme, G.; Puls, G.; Seufert, O. (Institut fur Radiologie und Strahlenklinik, Krankenhaus Celler Strasse, 3300 Brunswick, W. Germany). *Therapiewoche* 27(47):8592, 8595-8597, 8600-8603; 1977.

Therapeutic trials with loperamide hydrochloride (Imodium), a new antidiarrheal drug acting directly on the intestinal wall, are described. Double-blind cross-over trials were performed in 10 patients with chronic diarrhea. The diarrhea was of undetermined genesis in five cases; chronic ulcerative colitis was diagnosed in three cases, irritable colon and proctitis in one, and diverticulitis in another. Reasec (diphenoxylate hydrochloride + atropine sulfate) was given as a reference drug. The duration of the treatment with the first drug was up to 35 days, after which the patients were switched to the other (unknown) drug upon recurrence of diarrhea. Both drugs were administered in doses of 10 mg/day. Imodium reduced the frequency of defecation and increased the consistency of the feces more effectively than did Reasec. At the end of the treatment, but before the code was broken, seven patients preferred Imodium to Reasec, two preferred the latter, and one was undecided. Side-effects were seen in five patients; there was only one patient who had side-effects exclusively under Imodium therapy. Forty-five patients with radiogenic diarrhea caused by telecobalt irradiation (total focal dose 575-6,000 rads, average 3,454 rads) were treated with Imodium (average dose 4.51 mg/day, total dose 52.53 mg, average length of treatment 12 days). Normalization of the defecation frequency and of the consistency of the feces were achieved in 42 of the 45 patients after 6.4 days of treatment. The hematological and biochemical examinations (SGPT, SGOT, alkaline phosphatase, creatinine, urea nitrogen, erythrocyte count, WBC count and differential blood picture) showed no changes.

3406 LONG-TERM SURVEY OF THE TREATMENT OF DIARRHEA WITH LOPERAMIDE. (Eng.) Mainguet, P.; Fiasse, R.; Turine, J. B. (Avenue J. Delleur 20, B-1170 Brussels, Belgium). *Digestion* 16(1/2): 69-76; 1977.

Long-term efficacy and safety of loperamide and its possible morphine-like effect were studied in 42 outpatients with chronic diarrhea of varying etiology. Individually adapted doses (2-12 mg) were administered for 140-1,159 days. The daily number of bowel movements, the consistency of stools, and the number of capsules used were recorded. In 32 patients, some of the following indices were estimated: ESR, Hb (hemoglobin), RBC, Hc, WBC and its differential count, and serum iron. In 10 patients, the pupil diameters were measured after the subcutaneous injection of 1 ml of naloxone; this test was also performed in 10 subjects following the injection of an isotonic NaCl solution. No significant difference was observed in loperamide consumption between subjects treated for 6 months, 1 yr, and 2 yr. The mean daily stool frequency in all patients dropped from 6 to 2 ($p<0.0001$) during the first year of treatment. In 25 patients treated longer, it decreased from 5.75 to 2 during the first year ($p<0.0001$) and to 2.5 during the second year ($p<0.0001$). In 11 patients treated for more than 2 yr, the daily stool frequency decreased from 6 to 3 during the first year ($p=0.0005$), to 3 in the second year ($p=0.0005$), and to 2.5 in the third year ($p=0.0006$). In patients whose stools were liquid at the beginning of treatment, the stools became "loose" during the first year ($p<0.0001$). In the group treated longer than 2 yr, the stools were "formed" during the first year ($p=0.0006$) and "loose" during the second ($p=0.03$) and the third ($p=0.0005$) years. The treatment was unsuccesful in five patients with chronic diarrhea of unknown etiology. No adverse effects of loperamide were observed, and laboratory tests did not show any drug-related anomalies in blood composition. No significant difference in the pupil diameters was found between patients injected with naloxone or NaCl solution. The studies proved the efficacy and safety of loperamide in the treatment of chronic diarrhea, and no morphine-like effect was observed.

3407 PROSTAGLANDIN-INDUCED DIARRHOEA TREATED WITH LOPERAMIDE OR DIPHENOXYLATE: A DOUBLE-BLIND STUDY. (Eng.) Lange, A. P.; Secher, N. J.; Amery, W. (Odense Sygehus, Odense, Denmark). *Acta Med. Scand.* 202(6):449-454; 1977.

Loperamide was compared double-blind with diphenoxylate and a placebo in 59 women with diarrhea due to prostaglandin administration for mid-trimester abortion. Treatment was started with the intake of two capsules (2 mg loperamide/capsule or 2.5 mg diphenoxylate/capsule) 2 hr before the first i.m. injection of 15(S-)15 methyl prostaglandin $F_{2\alpha}$ (250 μg every 2 hr) and was then adapted individually, i.e., one capsule after each unformed stool, with a maximum of 10 per 24 hr. Both antidiarrheals were significantly more effective than the placebo in preventing diarrhea, and loperamide was found to be more active than diphenoxylate. The number of double-blind capsules taken per 1 ml of injected prostaglandin solution was significantly higher with the placebo than with loperamide ($p=0.05$), but the difference with diphenoxylate was not significant. The amount of drug in milligrams used per 2 ml prostaglandin was significantly higher with diphenoxylate than with loperamide ($p=0.008$). The mean amounts were 3.5 mg with diphenoxylate as compared with 2.3 mg with loperamide, suggesting that the latter is at least 1.5 times more active than the reference substance in this type of diarrhea. The course of abortion, blood pressure, and vital signs, or prostaglandin side-effects other than diarrhea were not affected by either antidiarrheal, nor could any adverse experience be specifically attributed to them.

3408 SURGICAL MANIFESTATIONS OF EOSINOPHILIC GASTROENTERITIS IN THE PEDIATRIC PATIENT. (Eng.) Hoefer, R. A.; Ziegler, M. M.; Koop, C. E.; Schnaufer, L. (Children's Hosp. Philadelphia, 34th and Civic Center Blvd., Philadelphia, PA 19104). *J. Pediatr. Surg.* 12(6):955-962; 1977.

Four cases of eosinophilic gastroenteritis in children are added to the 11 retrieved from a literature review. The inflammation in these cases and in those in the literature was characterized by mature eosinophils predominating a transmural process, which produced pain, obstruction, perforation, bleeding, or fistulae. All levels of the gastrointestinal tract were involved, but the stomach (25.9%) and small bowel (66.7%) lesions were most common. Eosinophilia occurred in 61% of children and allergy in 13%. X-rays demonstrated a diffuse or localized process. Operative intervention was necessary in some cases to exclude tumors or regional enteritis, and at times to extirpate complications of local disease, but conservative therapy was the treatment of choice for this exacerbating-remitting disease.

3409 NECROTIZING ENTEROCOLITIS: CONTROLLED STUDY OF 3 YEARS' EXPERIENCE IN A NEONATAL INTENSIVE CARE UNIT. (Eng.) Bunton, G. L.; Durbin, G. M.; McIntosh, N.; Shaw, D. G.; Taghizadeh, A.; Reynolds, E. O. R.; *et al.* (Univ. Coll. Hosp. and Medical Sch., London, England). *Arch. Dis. Child.* 52(10):772-777; 1977.

To obtain information about possible predisposing factors in necrotizing enterocolitis (NEC), clinical data from 17 infants treated for NEC were compared with those in 51 controls. The incidence of NEC was 0.2% of live births at the University College Hospital during a 3-yr period and 2.7% of those referred from elsewhere. The mean birth weight of the affected infants was 1,832 g (range 878-3,850 g) and mean gestational age, 33 weeks (range 28-40 weeks). The illness was diagnosed at a mean age of 16 days (range 3-33 days). Fourteen infants survived. One infant developed NEC because of a volvulus, and another because of an apparently abnormal arterial supply to a segment of bowel. Birth asphyxia, the use of umbilical catheters, the length of time that these catheters were in place, and complications of catheterization were all significantly more frequent in the infants who developed NEC than in the controls. These findings support the view that hypoxia and ischemia of the gut wall are important in the pathogenesis of NEC.

3410 SKIN LESIONS IN ACQUIRED ZINC DEFICIENCY DUE TO PARENTERAL NUTRITION.

(Eng.) van Vloten, W. A.; Bos, L. P. (Univ. Hosp., Leiden, Netherlands). *Dermatologica* 156(3):175-183; 1978.

Skin lesions seen in 10 patients who received parenteral nutrition during treatment of chronic enteropathy are described. All patients had a lowered serum zinc concentration (2 μM). The skin lesions were similar to those seen in acrodermatitis enteropathica, and occurred on the face (seborrhoic-like lesions), trunk, and groin (vesicular-pustular lesions). After supplementation with zinc sulfate, the skin lesions disappeared completely. A decrease in the serum alkaline phosphatase level can be regarded as a sign of an impending zinc deficiency. Parenteral nutrition should contain a sufficient amount of zinc.

3411 CELLULAR IMMUNITY IN ADULT MARASMUS.

(Eng.) Bistrian, B. R.; Sherman, M.; Blackburn, G. L.; Marshall, R.; Shaw, C. (Cancer Res. Inst., 194 Pilgrim Rd., Boston, MA 02215). *Arch. Intern. Med.* 137(10):1408-1411; 1977.

Studies were carried out in 12 patients with marasmus to determine what deficits in immune function are found when the serum albumin level is maintained and what degree of adult marasmus is necessary to produce immunodeficiency. All patients had recent weight loss to less than 85% of standard weight/height ratio and a serum albumin level of at least 3 g/100 ml. Cellular immune function was assessed by delayed hypersensitivity skin testing to *Candida* and streptokinase-streptodornase; peripheral lymphocyte count; proportion of thymus- and bone marrow-derived lymphocytes; and whole blood and isolated lymphocyte transformation to phytohemagglutinin, pokeweed mitogen, concanavalin A, *Candida*, and streptokinase-streptodornase. Significant impairment of skin test reactivity while *in vitro* responsiveness remained intact was noted in the marasmic patients. No impairment was found in 12 individuals with recent weight loss who remained at a weight greater than the 85% weight/height ratio. In four marasmic individuals in whom weight loss was arrested by nutritional repletion, skin reactivity returned without substantial change in weight. In this type of marasmus, both depleted nutritional status and weight loss must be present for impairment of skin test responsiveness. These findings confirm relative sparing of more vital functions dependent on protein metabolism in adult marasmus compared to the kwashiorkor-like syndrome of hypoalbuminemic malnutrition seen in adults.

3412 H_2-HISTAMINE RECEPTOR BLOCKING AGENTS IN THE ZOLLINGER-ELLISON SYNDROME: EXPERIENCE IN SEVEN CASES AND IMPLICATIONS FOR LONG-TERM THERAPY.

(Eng.) McCarthy, D. M.; Olinger, E. J.; May, R. J.; Long, B. W.; Gardner, J. D. (Natl. Inst. Arthritis, Metabolism and Digestive Diseases, Bldg. 10, Rm. 9D-17, Natl. Inst. Health, Bethesda, MD 20014). *Ann. Intern. Med.* 87(6):668-675; 1977.

The value of metiamide and cimetidine in the management of the Zollinger-Ellison syndrome was assessed in seven patients with this syndrome (serum gastrin >300 μg/ml, basal acid output >15 mEq/hr, ratio of basal acid output to maximal acid output >0.5). The i.v. or p.o. administration of the drugs lowered acid secretion by at least 70% in all cases. Subsequent treatment of six patients for 3 to 15 months (p.o. therapy) and one patient for 1 month (i.v. therapy) showed that the drugs abolished symptoms in all seven, abolished diarrhea in five, allowed ulcer healing in six, and were well tolerated without adverse effects in all seven. No patient failed to respond to the drug, although one died from tumor progression and two required total gastrectomy for complex reasons. The results indicate that patients with Zollinger-Ellison syndrome can be managed medically and, in light of current mortality trends, gain little from the extra risks attending total gastrectomy.

3413 USE OF CALCIUM AND SECRETIN IN THE DIAGNOSIS OF GASTRINOMA (ZOLLINGER-ELLISON SYNDROME).

(Eng.) Deveney, C. W.; Deveney, K. S.; Jaffe, B. M.; Jones, R. S.; Way, L. W. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Ann. Intern. Med.* 87(6):680-686; 1977.

To delineate the role of calcium and secretin tests in the diagnosis of gastrinoma, 65 patients with peptic ulcer disease were evaluated for gastrinoma (Zollinger-Ellison syndrome) by measuring changes in serum gastrin concentration after the i.v. administration of calcium or secretin, or both. The presence of gastrinoma was established in all 20 patients whose serum gastrin increased by 395 pg/ml or more after i.v. calcium (4 mg/kg/hr, 3 hr) and in all 18 patients whose serum gastrin concentration increased by 110 pg/ml or more after i.v. secretin (2 U/kg). The experience with these patients shows that stimulation by calcium or secretin may confirm the presence of gastrinoma in cases where the diagnosis would otherwise remain obscure. Although a positive response to calcium or secretin is diagnostic for gastrinoma, a negative response does not exclude this diagnosis. Stimulation with secretin is preferred for screening for gastrinoma because it is quicker and more reliable than calcium.

3414 HISTOCOMPATIBILITY ANTIGENS (HL-A) IN COW'S MILK INTOLERANCE WITH MALABSORPTION SYNDROME IN CHILDREN [Abstract]. (Eng.) Kuitunen, P.; Tiilikainen, A.; Visakorpi, J. K. (No affiliation given). *Acta Paediatr. Belg.* 29(2):126; 1976.

3415 SOME CLINICAL DATA OF PROGNOSTIC IMPORTANCE IN PROTEIN-CALORIE MALNUTRITION (PCM). (Eng.) Laditan, A. A. O. (Inst. Child Health, Univ. Coll. Hosp., Ibadan, Nigeria). *Trop. Geogr. Med.* 28(3):216-219; 1976.

3416 EARLY SIGNS OF PROTEIN-CALORIE MALNUTRITION. (Eng.) DeMaeyer, E. M. (Nutrition Unit, World Health Organization, CH-1211 Geneva 27, Switzerland). *Bibl. Nutr. Dieta* (23):1-8; 1976.

3417 FURTHER POINTS ABOUT EARLY SIGNS OF PROTEIN-CALORIE MALNUTRITION. DISCUSSION CONTRIBUTION. (Eng.) Truswell, A. S. (Dept. Nutrition, Queen Elizabeth Coll., Univ. London, Campden Hill, London W8 7AH, England). *Bibl. Nutr. Dieta* (23):9-13; 1976.

3418 GASTRIC ACID, pH AND PEPSIN IN HEALTHY AND PROTEIN CALORIE MALNOURISHED CHILDREN. (Eng.) Shashidhar, S.; Shah, S. B.; Acharya, P. T. (Medical Coll., Baroda 390001, India). *Indian J. Pediatr.* 43(341):145-151; 1976.

3419 STUDY OF FERRUM METABOLISM IN MAN AFTER ORAL ADMINISTRATION OF ^{59}Fe. (Rus.) Gorobets, V. F.; Gabuniya, R. I. (Scientific Res. Inst. Medical Radiology, USSR Acad. Medical Sciences, Obninsk, USSR). *Med. Radiol. (Mosk.)* 22 (3):11-17; 1977.

3420 THE ROLE OF BREAST MILK IN THE IMMUNOLOGICAL PROTECTION OF THE NEONATAL GASTROINTESTINAL TRACT. (Rus.) Prozorovskaya, K. N.; Abrosimova, N. A.; Gorodnichenko, L. I.; Artemenko, L. V. (Moscow Scientific Res. Inst. Pediatrics and Pediatric Surgery, RSFSR Ministry of Public Health, Moscow, USSR). *Pediatriia* (5):31-34; 1977.

3421 THE GUT AS A POLYENDOCRINE SYSTEM. (Fre.) Casthelaz, M.; Griessen, M.; Felber, J. P. (Hopital Cantonal, CH-1211 Geneva, Switzerland). *Schweiz. Med. Wochenschr.* 107(2):33-37; 1977.

3422 STAGES AND LIMITS OF DIAGNOSIS IN GASTROINTESTINAL DISEASES. (Ger.) Strohmeyer, G.; Miller, B.; Wienbeck, M. (2. Medizinische Universitatsklinik und Poliklinik, Moorenstrasse 5, D-4000 Dusseldorf, W. Germany). *Internist (Berlin)* 18(3):137-148; 1977.

3423 THE EFFECT OF ANTACID THERAPY ON THE INTRAGASTRIC PROTEOLYSIS IN CHILDREN WITH GASTRODUODENAL DISEASES. (Rus.) Apostolov, B. G.; Mendzheritsky, I. M.; Samarina, G. Ya. (Dept. Pediatrics, Leningrad Inst. Sanitation and Hygiene, Leningrad, USSR). *Vopr. Okhr. Materin. Det.* 22(2):35-37; 1977.

3424 TOTAL EFFECTS OF GASTRIN (PENTAGASTRIN). (Rus.) Rafes, Yu. I.; Yagmur, S. S. (Dnepropetrovsk Inst. Gastroenterology, Dnepropetrovsk, USSR). *Ter. Arkh.* 49(2):37-38; 1977.

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3426 PANPUR® IN THE TREATMENT OF DIGESTIVE DISTURBANCES OF VARIOUS ETIOLOGY. (Ger.) Liebhart, M. (Krankenhaus St. Josef des Caritasverbandes fur die Diozese Regensburg e. V., Landshuter Strasse 65, 8400 Regensburg, W. Germany). *Therapiewoche* 26(37):5734-5739, *passim*; 1976.

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3428 THERAPEUTIC USE OF SECRETIN. (Rus.) Rafes, Yu. I.; Melnichenko, L. Ya.; Bogdanovich, E. A.; Kornilova, S. N. (Dept. Hepatic Pancreatic Diseases, Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Vrach. Delo.* (8):47-51; 1976.

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3432 FOOD ALLERGY: DOES IT EXIST? (Ita.) Grilliat, J. P.; Moneret-Vautrin, D. A. (C.H.U. Brabois, 54000 Nancy, France). *Minerva Med.* 68(15):1001-1006; 1977.

3433 ANEURYSMS OF ABDOMINAL ARTERIES. REPORT OF TWO CASES. (Spa.) Lopez-Rios Fernandez, F.; Soleto Saez, E.; Ruiperez Polo, S.; Velasco, J. M.; Freire Rodriguez, D.; Vazquez Llamas, G.; *et al.* (Ciudad Sanitaria de la Seguridad Social "La Paz," Residencia General, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(2):163-176; 1977.

3434 RARE ABDOMINAL SYNDROMES. (Ger.) Zangl, A. (Landeskrankenanstalten, Mullner Hauptstrasse 48, A-5020 Salzburg, Austria). *Wien. Med. Wochenschr.* 127(14):448-451; 1977.

3435 COMPLICATIONS AND RISKS OF ABDOMINAL DISEASES IN OLD SURGICAL PATIENTS. (Ger.) Mlynek, H. J.; Hartig, W.; Schenker, U.; Winiecki, P. (I. Chirurgische Klinik, Bezirkskrankenhaus St. Georg, Strasse der SDF 141, DDR-7021 Leipzig, E. Germany). *Zentralbl. Chir.* 102(5):283-296; 1977.

3436 ARCHED LIGAMENT SYNDROME (REPORT OF 5 CASES). (Fre.) Boyer, J.; Ben Bouali, A.; Baudet, P.; English, P.; Pillet, P.; Joubaud, F. (No affiliation given). *Gastroenterol. Clin. Biol.* 1(6/7):608; 1977.

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3438 INTESTINAL AND IMMUNOLOGICAL CHANGES IN DERMATITIS HERPETIFORMIS (DUHRING'S DISEASE). (Ger.) Klehr, N.; Schneider, C. (Zentrum der Dermatologie und Venerologie der J. W. Goethe-Universitat Frankfurt am Main, Theodor-Stern-Kai 7, 6000 Frankfurt am Main, W. Germany). *Z. Hautkr.* 52(15):785-790; 1977.

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3440 RETROPERITONEAL LYMPHANGIAL DYSPLASIA WITH EXUDATIVE ENTEROPATHY. REPORT OF A CASE OF CYSTICALLY DILATED CISTERNA CHYLI WITH SPLEEN CYSTS. (Ger.) Ferenci, P.; Wolf, G.; Feigl, W.; Tuchmann, B.; Imhof, H.; Leypold, F.; Pesendorfer, F. (Lehrkanzel fur Gastroenterologie und Hepatologie, I. Medizin. Univ.-Klin. Wien, Lazarettgasse 14, A-1090 Vienna, Austria). *Z. Gastroenterol.* 14(8):756-766; 1976.

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3443 CONTRIBUTION TO THE STUDY OF IRON METABOLISM IN MALNOURISHED CHILDREN. (Por.) Faggioni, L. G.; Goncalves, A. L.; Granzotti, J. A. (Hospital das Clinicas, Rua Bernardino de Campos, 1000, 14.100, Ribeirao Preto, Sao Paulo, Brazil). *Arq. Gastroenterol.* 14(2):102-105; 1977.

3444 EARLY MELENA IN NEONATES BORN FROM HIGH-RISK PREGNANCY. (Ita.) Cianci, S.; Santangelo, G.; Benfatto, G.; Sorbello, A.; Maccarrone, N. (II Cattedra di Clinica Ostetrica e Ginecologica dell'Universita di Catania, Catania, Italy). *Minerva Pediatr.* 29(9):627-632; 1977.

3445 ANIMAL EXPERIMENTS ON THE USE OF CONTRYKAL® (A TRYPSIN-KALLIKREIN INHIBITOR) IN PERITONITIS. (Ger.) Albert, H.; Neumann, S.; Kothe, W.; Hartig, W.; Brand, G.; Engel, C. (Chirurgische Klinik der Karl-Marx-Universitat, Liebigstrasse 20, DDR-701 Leipzig, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(1):23-26; 1977.

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3447 PLACE OF RADIOLOGY IN THE DIAGNOSIS AND TREATMENT OF HEMORRHAGES OF THE UPPER GASTROINTESTINAL TRACT. (Fle.) De Schepper, A. (Dienst voor Radiodiagnose, A. Z. Stuivenberg, Antwerpen, Belgium). *Tijdschr. Gastroenterol.* 19 (5):325-332; 1976.

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Demling, L.; Supala, S.; Rosch, W. (Medizinische Universitatsklinik, Krankenhausstrasse 12, D-8520 Erlangen, W. Germany). *Chirurg* 48(4):193-197; 1977.

3449 CLINICAL AND THERAPEUTIC ASPECTS OF HEMORRHAGES OF THE UPPER GASTROINTESTINAL TRACT. (Fle.) Standaert, L. O. (St. Elisabeth Ziekenhuis, C. O. O. Antwerpen, Lange Lazanastraat, 222, B-2000 Antwerpen, Belgium). *Tijdschr. Gastroenterol.* 19(5):333-346; 1976.

3450 HEMORRHAGE OF THE UPPER GASTROINTESTINAL TRACT: CURRENT STATUS AT ANTWERP. (Fle.) Dewilde, T.; Hubens, A. (Dienst Algemene Heelkunde, A. Z. Stuivenberg, Antwerp, Belgium). *Tijdschr. Gastroenterol.* 19(5):299-315; 1976.

3451 CONSIDERATIONS ON DIGESTIVE TRACT HEMORRHAGE IN CHILDREN. (Ita.) Ambrosioni, G.; Battisti, C.; Cairoli, G.; Giuntoli, M. (Ospedale Maggiore C. A. Pizzardi Ente Ospedaliero Regionale, Bologna, Italy). *Minerva Pediatr.* 29 (9):621-626; 1977.

3452 GASTROINTESTINAL HEMORRHAGES DURING INFANCY. (Ger.) Joppich, I. (Kinderchirurgische Klinik, Theodor-Kutzer-Ufer, D-6800 Mannheim 1, W. Germany). *Med. Klin.* 72(14):575-582; 1977.

3453 ENDOSCOPIC HEMOSTASIS BY MEANS OF HIGH-ENERGY NEODYMIUM-YAG LASER IN GASTROINTESTINAL HEMORRHAGE. (Ger.) Kiefhaber, P.; Nath, G.; Moritz, K. (Medizinische Universitatsklinik Innenstadt Munchen, Ziemssenstrasse 1, D-8000 Munich 2, W. Germany). *Chirurg* 48(4):198-203; 1977.

See also, 2892, 2920, 2922, 2948, 2949, 2970, 2971, 2984, 2991, 2992, 3001, 3011, 3016, 3074, 3077, 3106, 3113, 3114, 3136, 3150, 3169, 3174, 3197, 3202, 3220, 3261, 3262, 3282, 3295, 3296, 3467.

GENERAL

Parasitology

3454 HEPATIC AMEBIASIS--ANALYSIS OF 56 CASES. II. LABORATORY AND CHEST X-RAY FINDINGS. (Eng.) Carneiro Chaves, F. J. Z.; Cruz, I.; Gomes, C.; Domingues, W.; Marques da Silva, E.; Tavarela Veloso, F. (Hosp. de S. Joao, Porto, Portugal). *Am. J. Gastroenterol.* 68(3):273-277; 1977.

Laboratory and chest x-ray findings are reviewed in 56 previously reported patients with hepatic amebiasis. Anemia and an elevated ESR, frequently without an elevated WBC count, were the most frequent hematologic findings; anemia occurred in 60.7% of patients, and an elevated ESR was found in 92.9%. Abnormalities of liver function tests were mild and nonspecific. The most frequent abnormality seen in the chest x-ray was an elevated right hemidiaphragm (74.5% of 55 patients x-rayed). The motility of the hemidiaphragm on fluoroscopy was reduced or abolished in 24 of 36 cases. These abnormalities may be useful in the diagnosis of amebiasis in endemic areas where more sophisticated facilities may not be available.

3455 A COMPARISON OF A SHORT COURSE OF SINGLE DAILY DOSAGE THERAPY OF TINIDAZOLE WITH METRONIDAZOLE IN INTESTINAL AMOEBIASIS. (Eng.) Misra, N. P.; Gupta, R. C. (Gandhi Medical Coll., Bhopal, India). *J. Int. Med. Res.* 5(6):434-437; 1977.

The therapeutic value of tinidazole was compared with that of metronidazole in 60 patients with symptomatic intestinal amebiasis who were treated for 3 days with a single dose of 2 g of either drug, resp., by random order. Tinidazole cured 27/30 patients and metronidazole cured 16/30 patients ($p<0.01$). Mild side-effects were reported by 8/30 patients in the tinidazole group as compared to mild to moderate side-effects reported by 16/30 patients in the metronidazole group ($p<0.05$). As the average patient has only a limited understanding and toleration of extended treatment courses, the advantages of a short course employing a single daily dose are obvious. With such a regimen, tinidazole is superior to metronidazole in the treatment of intestinal amebiasis.

3456 TREATMENT OF HEPATIC HYDATID DISEASE WITH MEBENDAZOLE: PRELIMINARY RESULTS IN FOUR CASES. (Eng.) Bekhti, A.; Schaaps, J. P.; Capron, M.; Dessaint, J. P.; Santoro, F.; Capron, A. (Baviere Hosp., 4020 Liege, Belgium). *Br. Med. J.* 2(6094):1047-1051; 1977.

Clinical echotomographic and serological investigations were carried out in four patients who received mebendazole for the treatment of hepatic hydatid disease. In three patients, hydatidosis had remained after surgery, and in the fourth it could not be treated surgically. Mebendazole was given p.o. in maximum doses of 400-600 mg three times a day during courses lasting 21 to 30 days. Ultrasonic echotomography showed a complete regression of the intrahepatic cysts after 4 to 13 months in all four cases. In three patients, the course of treatment had to be repeated. Mebendazole also induced clinical improvement and a progressive lowering of the concentration of specific IgE of *Echinococcus granulosus*. During treatment, circulating blood levels of specific immune complexes of antigen 5 were increased. These observations indicate that mebendazole has a lethal effect on *E. granulosus* cysts in primary hydatid disease in man and that the efficacy of chemotherapy can be assessed with ultrasonography and by measuring changes in the concentration of specific IgE of *E. granulosus* and circulating immune complexes.

3457 GIARDIASIS IN DAY-CARE CENTERS: EVIDENCE OF PERSON-TO-PERSON TRANSMISSION. (Eng.) Black, R. E.; Dykes, A. C.; Sinclair, S. P.; Wells, J. G. (Center for Disease Control, Atlanta, GA 30333). *Pediatrics* 60(4):486-491; 1977.

An outbreak of diarrhea that occurred in children 1 to 3.5 yr old attending a day-care center during August and September 1975 was investigated. There were overlapping epidemics of shigellosis and giardiasis, with 54% of the children infected with *Giardia lamblia*. At two other centers, 29% and 38% of the children had *G. lamblia* infection, but none had *Shigella*. The prevalence of *G. lamblia* in the day-care children was significantly higher than the 2% prevalence in age-matched children not in day-care centers. The fact that the highest infection rate was found in mobile 1-yr-olds who were not toilet-trained suggests fecal-oral transmission of the parasite from child to child in the centers and from infected children to other family members.

3458 A COMMUNITYWIDE OUTBREAK OF GIARDIASIS WITH EVIDENCE OF TRANSMISSION BY A MUNICIPAL WATER SUPPLY. (Eng.) Shaw, P. K.; Brodsky, R. E.; Lyman, D. O.; Wood, B. T.; Hibler, C. P.; Healy, G. R.; *et al.* (Center for Disease Control, Atlanta, GA 30333). *Ann. Intern. Med.* 87(4):426-432; 1977.

An epidemiologic investigation was undertaken when 350 residents of Rome, New York, developed laboratory-confirmed cases of giardiasis between 1 November 1974 and 7 June 1975. A random household survey showed an overall attack rate for giardiasis (defined as a diarrheal illness of ≥5 days duration) of 10.6%. A significant association was discovered between having giardiasis and using city water and between having illness and drinking one or more glasses of water a day. The presence of human settlements in the Rome watershed area suggested that the water supply could have been contaminated by untreated human waste. The infectivity of municipal water was confirmed by producing giardiasis in specific pathogen-free dogs fed sediment samples of raw water obtained from an inlet of a city reservoir. A microscopic examination of the water sediments uncovered a *Giardia lamblia* cyst in one sample. This was the first time that a *G. lamblia* cyst has been found in municipal water in an epidemic and the first time that such water has been shown to infect laboratory animals.

3459 GIARDIASIS WITH TOTAL VILLOUS ATROPHY. (Eng.) Levinson, J. D.; Nastro, L. J. (55 Morris Ave., Springfield, NJ 07081). *Gastroenterology* 74(2, Part 1):271-275; 1978.

The case of a patient who developed symptomatic giardiasis with total villous atrophy after a tour of the Soviet Union is presented. The patient, a 57-yr-old woman, presented with a 2-week history of diarrhea and abdominal distention. Giardiasis was diagnosed by duodenal aspiration. A small intestinal biopsy revealed total villous atrophy in the absence of celiac sprue or a gastrointestinal immunodeficiency syndrome, a finding not previously described. The biopsy remains normal after a single course of metronidazole (250 mg, t.i.d., 10 days), despite subsequent exposure to gluten.

3460 ACUTE PERFORATING AMEBIC COLITIS. (Por.) Kerzner, A.; De Almeida Magalhaes, A.; Mattosinho Franca, L. C. (Hospital Sao Joaquim da Real e Benemerita Sociedade Portuguesa de Beneficencia de Sao Paulo, Sao Paulo, Brazil). *An. Paul. Med. Cir.* 104(1):57-69; 1977.

3461 HYDATID DISEASE: EPIDEMIOLOGY, DIAGNOSIS, AND THERAPY. (Ger.) Bahr, R.; Koslowski, L. (Chirurgische Universitatsklinik, Calwer Strasse 7, 7400 Tubingen, W. Germany). *Dtsch. Med. Wochenschr.* 102(30):1098-1101; 1977.

See also, 2665, 2917, 2919, 2937, 3017, 3254, 3257, 3432.

GENERAL

Regional Enteritis

3462 HISTOCHEMICAL COMPARISON OF THE EPITHELIAL MUCINS IN THE ILEUM IN CROHN'S DISEASE AND IN NORMAL CONTROLS. (Eng.) Culling, C. F. A.; Reid, P. E.; Dunn, W. L.; Clay, M. G. (Dept. Pathology, Univ. British Columbia, Vancouver V6T IW5, Canada). *J. Clin. Pathol.* 30(11):1063-1067; 1977.

Epithelial mucins were studied using routine and special histochemical methods in specimens of small intestine from patients with Crohn's disease and from normal controls. The normal ileal goblet cells were found to secrete a predominantly nonsulfated sialomucin. The neuraminidase insensitivity of the sialic acids of the small intestine was not due to either O-acylation at C_4 or an ester substituent at C_1. This finding implies that the protection against enzyme attack afforded to the mucosa by the mucin coat in the small intestine utilizes a different mechanism from that in the colon. Although, in many respects, the small intestinal mucins in Crohn's disease patients and in normal controls were similar, there was an increase in side-chain O-acylated sialic acids in such mucins in Crohn's disease. This difference has not been described before, probably because it can be seen only after staining such sections by the periodate-thionin Schiff/saponification/PAS and periodate-borohydride technique/saponification/PAS.

3463 CANCER IN CROHN'S DISEASE AFTER DIVERSIONARY SURGERY: A REPORT OF SEVEN CARCINOMAS OCCURRING IN EXCLUDED BOWEL. (Eng.) Greenstein, A. J.; Sachar, D.; Pucillo, A.; Kreel, I.; Geller, S.; Janowitz, H. D.; *et al.* (Mount Sinai Sch. Medicine, Fifth Ave. and 100th St., New York, NY 10029). *Am. J. Surg.* 135(1):86-90; 1978.

The incidence of bowel cancer was studied in 132 patients who had undergone bypass surgery for Crohn's disease and who had been admitted to one hospital between 1960 and 1976. Seven patients developed cancer (4/63 with ileocolitis and 3/69 with ileitis). All seven cancers appeared in excluded loops, four in small bowel and three in colon. Six cancers occurred at sites of previous active inflammatory disease and one in a relatively normal "skipped" area of cecum. Four were associated with fistulas, two with enterovesical, one with enterocutaneous, and one with both. In only one case was a tumor mass palpable. All seven patients in this series underwent operation, and all showed metastatic spread to liver, lymph nodes, or adjacent organs. All patients died within 2 yr following the diagnostic laparotomy. The mean latent period between onset of disease and appearance of cancer was 27 yr and between bypass surgery and appearance of cancer 13 yr. Four of the seven cancers occurred relatively early, within 4 yr of the bypass procedure, but all seven cases had one feature in common--a long duration of Crohn's disease (ranging from 17 to 44 yr) prior to the development of cancer. The diagnosis of cancer in excluded bowel was difficult to make and impossible to confirm prior to laparotomy. Among the large bowel cancers, a preoperative diagnosis was established by sigmoidoscopy in only one case. Cancer in a bypassed loop should be suspected in any case of Crohn's disease of long duration when a late recrudescence of symptoms occurs, especially when the symptoms are associated with the new appearance of fistula or mass.

3464 GALLSTONE PREVALENCE AND BILIARY LIPID COMPOSITION IN INFLAMMATORY BOWEL DISEASE. (Eng.) Marks, J. W.; Conley, D. R.; Capretta, T. L.; Bonorris, G. G.; Chung, A.; Coyne, M. J.; *et al.* (Cedars-Sinai Medical Center, 8700 Beverly Blvd., Los Angeles, CA 90048). *Am. J. Dig. Dis.* 22(12):1097-1100; 1977.

Biliary cholesterol saturation was correlated with disease variables that might affect bile acid loss in nine ileitis patients with intestinal resection and eight ileitis patients without intestinal resection having a defined prevalence of gallstones. In addition, cholesterol saturation was determined in 7 ulcerative colitis patients, 18 gallstone patients, and 5 normal controls. The biliary cholesterol saturation index in ileitis patients both with and without resection (2.34 ± 0.14 and 2.07 ± 0.09, resp.) was similar to that in gallstone patients (2.10 ± 0.05), yet the prevalence of gallstones was only 12%. Cholesterol saturation did not correlate with ileal resection or the extent, duration, or activity of ileitis. Biliary cholesterol saturation was not different in ulcerative colitis patients from that in normal subjects. It is concluded that cholesterol saturation of bile alone does not account for the high prevalence of cholesterol gallstones that has been reported in ileitis patients.

3465 PATHOGENESIS OF DIVERTICULITIS COMPLICATING GRANULOMATOUS COLITIS. (Eng.) Meyers, M. A.; Alonso, D. R.; Morson, B. C.; Bartram, C. (New York Hosp., 525 E. 68 St., New York, NY 10021). *Gastroenterology* 74(1):24-31; 1978.

The pathological and radiological features of diverticulitis complicating granulomatous colitis were correlated with granulomatous colitis and associated diverticula in 21 patients who underwent resection during a 14-yr period. Sigmoid diverticulitis was pathologically confirmed in 10 patients. The radiological signs of peridiverticulitis complicating granulomatous colitis usually showed clear evidence of the underlying pathological changes. They included localized diverticular perforation, sometimes with multiple communications via a paracolonic sinus tract, mass pressure from the paracolic abscess, and occasionally some degree of communication with deep fissuring ulcers of Crohn's disease. Because diverticula breach the colonic wall, histological analysis confirms that their involvement by the transmural process of granulomatous colitis predisposes to peridiverticulitis and/or abscess formation.

3466 APHTHOID ULCERS IN CROHN'S COLITIS. (Eng.) Simpkins, K. C. (General Infirmary, Leeds, England). *Clin. Radiol.* 28(6):601-608; 1977.

One hundred and nine double-contrast barium enema examinations were carried out in 91 adults with Crohn's colitis, and the radiographs were examined for the presence of aphthoid ulcers. These small discrete ulcers were found in 40 patients and in 48 of the 109 examinations. Seen *en face*, each ulcer appeared as a central fleck of barium surrounded by a translucent halo set amid a patch of normal mucosa. Their detection gave a more accurate assessment of the extent of disease. The radiographic demonstration of the evolution of ulceration is illustrated; it closely reflected what was seen on macroscopic examination of excised specimens and explains the characteristic patchiness and discontinuity of disease.

3467 HOME PARENTERAL NUTRITION AS PRIMARY THERAPY IN PATIENTS WITH EXTENSIVE CROHN'S DISEASE OF THE SMALL BOWEL AND MALNUTRITION. (Eng.) Fleming, C. R.; McGill, D. G.; Berkner, S. (Mayo Clinic, 200 First St. SW, Rochester, MN 55901). *Gastroenterology* 73(5):1077-1081; 1977.

Experience with seven patients with extensive Crohn's disease who had received nightly supplementary home parenteral nutrition (HPN) for a total of 120 patient months is presented. Indications for HPN were short bowel in five patients, growth failure in one, and gastric outlet obstruction in one. Before HPN, body weight averaged 72% of ideal body weight in five patients; one adolescent was less than the third percentile in weight. Anthropometry in six patients confirmed the decrease in fat and lean body mass in all. All patients were anemic, and serum albumin was low in six of seven (1.8-3.0 g/dl). During HPN, the average weight gain was 11 kg in the six patients treated for 6 months or longer. Hemoglobin increased an average of 1.5 g/dl and serum albumin increased an average of 1.0 g/dl. There was 50% fewer hospitalizations after HPN was begun compared with similar time periods before HPN. HPN did not prevent or reverse complications of Crohn's disease other than malnutrition. Major complications were displacement of the catheter on two occasions in one patient and metabolic acidosis in two patients. Sepsis did not occur. HPN is justified in selected patients with extensive Crohn's disease and malnutrition in that patients gain weight, nutritional parameters improve, and patients' activities increase as the number of hospitalizations decrease.

3468 CROHN'S DISEASE: CLINICAL AND THERAPEUTIC EXPERIENCE. (Spa.) Serrano Sanchez, P. A.; Martinez-Pineiro Carames, M.; Perez-Bedmar Pelaez, J. A.; Miras Estacio, M. (Gran Hospital del Estado, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(4):391-408; 1977.

3469 CROHN'S DISEASE IN THE NORTHERN DEPARTMENTS OF FRANCE. (Fre.) Paris, J.; Paris, J. C.; Claerbout, J. F. (Clinique des Maladies de L'Appareil digestif, C.H.U., 59000 Lille, France). *Bull. Acad. Natl. Med. (Paris)* 161(3):194-196; 1977.

See also, 2950, 3138, 3159, 3189, 3211, 3411.

NUMBERS FOLLOWED BY AN ASTERISK INDICATE ABSTRACTS. OTHER NUMBERS REFER TO CITATIONS.

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ABSTRACTS
AND
CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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SUBJECT INDEX

The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, µl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter		
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotidephosphate
dl	deciliter		
DNA	deoxyribonucleic acid	NADPH	reduced nicotinamide adenine dinucleotidephosphate
ED_{50}	median effective dose(s)		
EDTA	ethylenediamine tetraacetic acid	ng	nanogram (10^{-9})
e.g.	for example	nm	nanometer(s)
EEG	electroencephalogram	Pa	ambient pressure
ESR	erythrocyte sedimentation rate	PAS	periodic acid - Schiff
g	gram(s)	pg	picogram (10^{-12})
µg	microgram(s)	pgEq	picogram equivalent(s)
Hz	Hertz	p.o.	orally
hr	hour(s)	ppb	parts per billion
Ig	immunoglobulin(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K_m	Michaelis constant	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
µM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, µCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

3470 NAFENOPIN-INDUCED PROLIFERATION OF PEROXISOMES IN THE SMALL INTESTINE OF MICE. (Eng.) Psenicnik, M.; Pipan, N. (Medical Faculty Univ., Yu-6100 Ljubljana, Lipiceva 2, Yugoslavia). *Virchows Arch.* [*Cell Pathol.*] 25(2): 161-169; 1977.

The effect of nafenopin on the epithelial cells of the small intestine was studied in male Albany mice to determine whether the peroxisomal response to the hypolipidemic drug and the accompanying hypolipidemic effects seen in hepatocytes also occur in other tissues. The mice were fed white bread to which nafenopin was added to provide a daily dose of 1.25 g/kg, and, after 17 days, the control and nafenopin-treated groups were sacrificed. The tissues were incubated in alkaline DAB medium. Ultrathin sections of small intestinal tissue were examined by electron microscopy, and morphological differences in the peroxisomes and mitochondria between the controls and the experimental group were quantitated. In the nafenopin-treated group, proliferation of peroxisomes occurred, as indicated by significant increases in volume, surface, and numerical density of these structures compared with controls. No such alterations were found in the mitochondria. These results show that the response of small intestinal epithelial cells to nafenopin is analogous to that produced in hepatocytes by the same drug. Hepatocyte peroxisomes are supposed to be involved in lipid metabolism, and it seems that small intestinal epithelial peroxisomes play a similar role.

3471 VASCULARIZATION OF THE MYENTERIC PLEXUS IN THE SMALL INTESTINE OF THE HOG AND CAT. (Ger.) Stach, W. (Anatomisches Institut des Bereichs Medizin, Wilhelm-Pieck-Universitat, Gertrudenstrasse 9, DDR-25 Rostock, E. Germany). *Acta Anat. (Basel)* 100(1):161-169; 1978.

The anatomy of the vascularization of the myenteric plexus of the small intestine was studied in 3- to 6-week-old piglets and 16- to 20-week-old cats. The ganglia of the myenteric plexus were found to have independent vascularization in the form of periganglionic capillary networks. As to architecture and density, these capillaries are quite different from the intramuscular capillary bed. The terminal arterioles and sphincteric capillaries running into the periganglionic capillary network are innervated by noradrenergic axons as are the arterial trunk and arcade vessels. Together with the periganglionic arteriovenous shunts, this architecture represents favorable prerequisites for a functionally adapted blood supply to the ganglia. The specific arrangement of intramuscular vessels and the myenteric plexus provides for the close topographic and functional relations between the two systems in all cases of change in the shape of the intestinal wall (e.g., contraction, relaxation, and filling).

3472 LYMPHOID FOLLICULAR PATTERN: A NORMAL FEATURE OF THE PEDIATRIC COLON. (Eng.) Laufer, I.; deSa, D. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Am. J. Roentgenol.* 130(1):51-55; 1978.

The lymphoid follicular pattern of the colon was examined in 27 patients less than 15 yr old who underwent double contrast enema. Tiny nodular filling defects up to 2 mm in diameter were seen in 12 of these 27 patients. This pattern was particularly common in children under 5 yr of age; filling defects were demonstrated in seven of nine such patients in whom a good double contrast study was achieved. Among 12 patients with diarrhea and/ or rectal bleeding, 10 had lymphoid hyperplasia. However, 5 of 15 patients in whom the condition was not demonstrated had the same symptoms. Only one patient, a girl with juvenile polyposis, underwent subsequent hospitalization. Subtotal colectomy was performed because of chronic malnutrition and failure to thrive. In all other patients, the final radiologic diagnosis was a normal colon with lymphoid hyperplasia. Although the above lymphoid follicular pattern of the colon has been termed lymphoid hyperplasia, it is suggested that it represents a normal lymphoid follicular pattern in the pediatric colon. The term lymphoid hyperplasia should be reserved for cases in which the lymphoid follicles are greater than 2 mm in diameter; this will usually represent an abnormal condition in response to infection, allergy, or immunologic disorders. Several conditions may have a radiographic appearance that resembles the lymphoid follicular pattern described above. Occasionally, particularly when familial polyposis is discovered in a young patient, the appearance of it may resemble lymphoid hyperplasia. In such cases, removal of a rectal polyp for histologic examination will establish the diagnosis. True lymphoid hyperplasia is one of the pathologic features of Crohn's disease, and it is not surprising that, in the early stages, mucosal modularity identical to the lymphoid follicular pattern can be seen. However, the patients described here tend to be older, and more advanced disease elsewhere in the gastrointestinal tract usually will provide the clue to the correct diagnosis.

3473 FLUORESCENCE STAINING OF GASTRIC MUCOSA. A STUDY WITH SPECIAL REFERENCE TO PARIETAL CELLS. (Eng.) Stave, R.; Brandtzaeg, P. (Natl. Hosp. Norway, Oslo, Norway). *Scand. J. Gastroenterol.* 12(7):885-891; 1977.

Precise and simple methods for enumeration of parietal cells alone or in combination with other cell types by paired staining were developed. Resected stomachs from patients with partial gastric resection were fixed at 4 C with either paraformaldehyde or 1-ethyl-3(3 dimethyl-amino-propyl)carbodiimide

HCl (CDI). After 24 hr in CDI, small specimens were dehydrated and paraffin embedded. Pieces of rat gastric mucosa were either processed as above or by alcohol fixation and then paraffin embedded. Other pieces were embedded fresh in Cryoform and frozen. Sera from two individuals with high parietal cell antibody titers (1:512) were used as the source of IgG to obtain fluorescein and rhodamine conjugates. Gastrin (G) cells were demonstrated by direct immunofluorescence, whereas parietal cells were demonstrated either directly or indirectly. Staining methods included the use of hematoxylin and eosin with saffron (HES) or hematoxylin, azophloxine, and saffron (HAS). Other sections were stained with PAS followed by eosin at various concentrations. The number of parietal cells in a standardized area unit was counted. Fluorescence visualization of parietal cells using both HES and HAS staining was superior to conventional light microscopy. It enabled recognition of parietal cells in the gastric body mucosa at low magnification. The HES and HAS methods did not satisfactorily visualize antrum parietal cells. The PAS-eosin method successfully demonstrated antrum parietal cells because of the contrasting red background of the pyloric glands. Paired visualization of parietal and G cells in the same tissue section was achieved immunohistochemically. This methodology is a prerequisite for detailed studies of these two cell types in the transitional zone between the gastric body and the pyloric antrum.

3474 PHALLOIDIN INHIBITS THE FORMATION OF A FILAMENTOUS WEB SURROUNDING ENDOCYTOTIC VACUOLES IN LIVER PARENCHYMAL CELLS. (Ger.) Jahn, W. (Abteilung Naturstoff-Chemie, Max-Planck-Institut fur medizinische Forschung, Heidelberg, W. Germany). *Cytobiologie* 15(3):452-462; 1977.

The effect of pretreatment of the isolated rat liver with phalloidin (1.5 mg) 15-20 min before perfusion at increased posthepatic pressure (15 cm of water column) on the formation of a filamentous web around endocytotic vacuoles was studied. Liver perfusion alone caused the formation of endocytotic vacuoles in the liver parenchymal cells, and most of the vacuoles were surrounded by a filamentous web. Small secondary vacuoles were formed during the spontaneous diminution of the vacuolization. The secondary vacuoles, formed from the primary ones, were found exclusively near by well-marked filamentous areas. Pretreatment of the liver with phalloidin prior to perfusion inhibited the formation of the filamentous web around the endocytotic vacuoles. Clusters of small vacuoles, seen after perfusion without phalloidin pretreatment, were not observed after pretreatment. The inhibiting effect of phalloidin on the formation of the filamentous web is most probably due to the fact that the filamentous web consists of F-actin polymerized from G-actin, with phalloidin causing the transformation of the entire G-actin into F-actin that is no longer available for the formation of the filamentous web. The filamentous web may participate in the release of water due to its contractile action.

3475 REGIONAL VARIATIONS IN ELECTROLYTE CONTENT OF SMOOTH MUSCLE OF OPOSSUM ESOPHAGUS: EFFECTS OF INHIBITION OF Na^+-K^+ ATPase [Abstract]. (Eng.) Schulze, K.; Hajjar, J. J.; Christensen, J.; Miller, S. (Univ. Iowa Coll. Medicine, Iowa City, IA 52242). *Fed. Proc.* 36(3):462; 1977.

3476 VENOUS ANGIOARCHITECTURE OF THE TUNICA MUSCULARIS IN THE ESOPHAGOGASTRIC TRANSITION SEGMENT IN MAN. (Eng.) Fujimura, I.; Ferraz de Carvalho, C. A. (Dept. Anatomy, Univ. San Paulo, Av. Dr. Arnaldo, 455, Sao Paulo, Brazil). *Acta Anat. (Basel)* 98(4):401-412; 1977.

3477 COMPARATIVE ULTRASTRUCTURE OF THE SURFACE EPITHELIUM OF STOMACH AND ESOPHAGUS [Abstract]. (Eng.) Friedman, M. H. F.; Marchant, L. M. (Philadelphia Coll. Osteopathic Medicine, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1059; 1977.

3478 THE SALIVARY GLANDS: ANATOMY AND EMBRYOLOGY (Eng.) Johns, M. E. (Walter Reed Army Medical Center, Washington, DC 20012). *Otolaryngol. Clin. North Am.* 10(2):261-271; 1977.

3479 GROSS AND MICROSCOPIC ANATOMY OF THE MAJOR SALIVARY GLANDS OF THE FERRET. (Eng.) Poddar, S.; Jacob, S. (Dept. Anatomy, Univ. West Indies, Mona, Kingston 7, Jamaica). *Acta Anat. (Basel)* 98(4):434-443; 1977.

3480 SALIVARY GLAND PHYSIOLOGY. (Eng.) Rice, D. H. (Wadsworth Hosp. Center, Wilshire and Sawtelle Boulevards, Los Angeles, CA 90073). *Otolaryngol. Clin. North Am.* 10(2):273-285; 1977.

3481 RECENT ADVANCES IN THE INVESTIGATION OF ENDOCRINE CELLS OF THE GUT [Abstract]. (Eng.) Polak, J. M.; Bishop, A. E.; Pearse, A. G. (Royal Postgraduate Medical Sch., London, England). *Rend. Gastroenterol.* 9(1):57-58; 1977.

3482 MULTIPLE HORMONAL APUD CELLS [Abstract]. (Eng.) Bishop, A. E.; Polak, J. M.; Bloom, S. R.; Buchan, A. M. J.; Pearse, A. G. E. (Royal Postgraduate Medical Sch., London W12 OHS, England). *Acta Endocrinol. (Kbh.)* 85(Suppl. 212): 103; 1977.

See also, 3510, 3519, 3521, 3544, 3557, 3577, 3587, 3598, 3600, 3608, 3643, 3769, 3770, 3775, 3779, 3780, 3783, 3784, 3801, 3806, 3813, 3822, 3824, 3851, 3862, 3873, 3895, 3938, 3976.

3483 TRANSPORT OF FAT THROUGH JEJUNAL ABSORPTIVE EPITHELIUM IN VITRO.

(Eng.) Mohiuddin, A.; Ahmed, M. M.; Chan, H. L. (Univ. Riyadh, Riyadh, Saudia Arabia). *Acta Anat.* 100(4):435-440; 1978.

The transport of fat through jejunal absorptive epithelium *in vitro* was studied in the white rat to determine the functional role of the infranuclear cytoplasm of the epithelial cells. The mucosa of excised pieces of jejunum from fasting rats was exposed for 10 min to fresh chyme obtained from other rats that had been digesting either buttered bread or bread alone and was then processed for electron microscopy. After exposure to fatty chyme, very fine lipid globules were seen between microvilli; larger globules were found in the supranuclear cytoplasm of all epithelial cells and in the infranuclear cytoplasm of some. The globules were found tightly bunched in supranuclear Golgi apparatus, and smaller collections were found in the infranuclear Golgi apparatus of some cells. Globules of an intermediate size were scattered more evenly in the cytoplasm both above and below the level of the nucleus. Occasional lymphatics in the villus core contained fat globules. Vesicles of little density were contained throughout the cells. But the most notable feature was the large collection of finely granular deposit in the deepest part of the infranuclear region between the mitochondria and endoplasmic reticulum above and the plasmalemma resting on the basement membrane below. These collections caused considerable elongation of the cells toward the lamina propria, and appeared to be nonlipid material conveyed there for clearance through the cell but not yet expelled due to the absence of blood flow through the villus. After exposure to chyme that did not contain fat, no globules of fat were seen in the epithelial cells or the lamina propria, but the low-density vesicles were more numerous in the cytoplasm, and the basal parts of the cells contained an even larger collection of finely granular nonlipid material than in the experiment with fatty chyme. The results support the hypothesis that infranuclear cytoplasm of absorptive epithelial cells takes part in the transport of absorbed fat, whose globules are collected in the infranuclear and supranuclear Golgi apparatus, but the possibility still exists that absorbed fat may leave through the sides of cells without reaching the bases.

3484 IDENTIFICATION OF KETONE BODIES AND GLUTAMINE AS THE MAJOR RESPIRATORY FUELS IN VIVO FOR POSTABSORPTIVE RAT SMALL INTESTINE.

(Eng.) Windmueller, H. G.; Spaeth, A. E. (Natl. Inst. Health, Bethesda, MD 20014). *J. Biol. Chem.* 253 (1):69-76; 1978.

The *in vivo* metabolism of circulating substrates was studied quantitatively in rat jejunal segments with an intact arterial supply and totally collected venous drainage. Net uptake or release of various blood metabolites was measured chemically, and the steady state rates of metabolism of arterial substrates to venous products were measured radiochemically. The major carbon sources taken up were glutamine, acetoacetate, 3-hydroxybutyrate, and glucose. Net uptake of each was in the range of 160 to 220 nmol/min/g intestine, which was equivalent to 30% of the circulating flux through the tissue for glutamine, 10% to 15% for the ketone bodies, and 2% for glucose. Plasma unesterified fatty acids were poorly utilized, less than 1% of the flux being taken up. Glutamine carbon was the source for about 35% of the CO_2 produced and ketone bodies for an additional 50%. The remaining CO_2 was derived from glucose (7%), lactate (5%), and unesterified fatty acids (3%). Additional end products for glutamine and ketone body carbon included lactate and, to a smaller extent, glucose. Glucose carbon atoms taken up were largely recovered as lactate and alanine, suggesting weak pyruvate dehydrogenase activity. Although the jejunum produced lactate, it also metabolized about 10% of the circulating lactate flux through the tissue, mostly to alanine. Half of the carbon of alanine released by jejunum was derived from blood lactate and the rest from the other metabolized substrates. Lactate uptake exceeded release when blood concentrations exceeded 1.2 to 1.6 mM. Nitrogenous end products of glutamine metabolism included NH_3 and alanine, and smaller amounts of ornithine, citrulline, and proline. These results identify ketone bodies and glutamine as the major respiratory fuels in postabsorptive small intestine *in vivo* and provide additional details regarding intermediary metabolism in this tissue.

3485 EFFECT OF TRANSIENT INTESTINAL ISCHAEMIA ON THE THORACIC DUCT LYMPH ABSORPTION OF ENDOTOXIN.

(Eng.) Nozickova, M.; Bartos, V.; Sedlak, J. (Inst. Clinical and Experimental Medicine, Budejovicka 800, 146 22 Praha 4, Czechoslovakia). *Lymphology* 10(3):161-165; 1977.

Changes of the thoracic duct lymph flow and composition attending intestinal ischemia and following intestinal revascularization were studied in eight mongrel dogs to assess the role of lymph vessels for the transport of toxic substances produced by or resorbed from the ischemic intestine. One-hour intestinal ischemia was produced by clamping the superior mesenteric artery and interrupting the intramural collaterals; revascularization was followed for 4 hr. Intestinal ischemia was associated with a decrease ($p<0.01$) in thoracic duct lymph flow, an increase in lymph/plasma ratio for total protein ($p<0.05$), and a rapid increase in the lactic acid level only in the blood of mesenteric vein ($p<0.01$). Lactic acid level remained elevated ($p<0.01$) in mesenteric venous blood and became elevated in the lymph ($p<0.01$) and arterial blood ($p<0.05$) during revascularization. LDH activity increased in mesenteric venous blood during ischemia and remained elevated during revascularization ($p<0.01$); in the lymph and in arterial blood, LDH levels rose ($p<0.01$ and $p<0.05$, resp.) during revascularization. The lymph/plasma ratio for total protein decreased significantly ($p<0.05$) after 1 hr of revascularization, and the thoracic duct lymph hematocrit was significantly ($p<0.01$)

elevated between 0.5 and 2 hr of revascularization. Using the limulus test, endotoxin activity was found in the lymph of four of six dogs and in the mesenteric vein blood in one dog before intestinal ischemia but was absent in arterial blood. After the 1 hr of ischemia, endotoxin was present in the lymph of all six dogs and in the venous blood of one. After 1 hr of revascularization, endotoxin was present in the thoracic duct lymph of six dogs, intestinal venous blood of four dogs and arterial blood of three dogs. It is concluded that during intestinal ischemia lymph transport from the gut is low but may be sufficient for the transport of endotoxin. Transport via the intestinal lymph significantly increases after revascularization, and limulus-positive substances escape from the ischemic intestine both via the lymph and blood.

3486 QUANTITATIVE RELATIONS BETWEEN THE MONOSACCHARIDE-INDUCED CHANGE OF ION TRANSPORT AND MONOSACCHARIDE ACCUMULATION IN THE RAT JEJUNUM. (Ger.) Remke, H.; Muhle, W.; Mothes, T.; Muller, F. (Physiologisch-Chemisches Institut, Karl-Marx-Universitat, 701 Leipzig, E. Germany). *Acta Biol. Med. Ger.* 36(7):7-15; 1977.

The changes induced by the Na^+-dependent transport of monosaccharides (10 mM) in the unidirectional influx of Na^+ and K^+ ions through the microvillous membrane (brush border) were studied in *in vitro* preparations of the rat jejunum. The monosaccharide-induced change in the Na^+ and K^+ influx was found to be a function of the ion gradients at the brush border. The monosaccharide-induced change in the permeability of the brush border also caused a decrease in the K^+ concentration and an increase in the Na^+ concentration during the energy-dependent accumulation of the monosaccharide. The monosaccharide concentration in the tissue reached an end value that was proportional to the change in the Na^+ and K^+ influx and to the change in the ion concentration; this end value remained unchanged even when the Na^+ gradient was eliminated and the intracellular K^+ concentration was low. The correlation between the elimination of the ion gradients and the rise in the monosaccharide concentration is explained by the monosaccharide-induced restriction of the active ion transport and the resulting change in the energy dissipation in favor of monosaccharide transport. The $(Na^+ + K^+)$-ATPase in the brush border is discussed as the possible transmitter of energy from the ion gradients.

3487 CORRELATION OF cGMP BUT NOT cAMP WITH SODIUM TRANSPORT IN INTESTINE [Abstract]. (Eng.) Gerzer, R.; Kautz, U.; Loeschke, K. (Medizinische Klinik der Universitat, Innenstadt, Ziemssenstrasse 1, D-8000 Munchen 2, W. Germany). *Pfluegers Arch.* 368(Suppl.):R21; 1977.

3488 REGIONAL CAPACITIES OF GASTROINTESTINAL ABSORPTION AND LYMPHATIC TRANSPORT FOR LIPID-SOLUBLE DYES IN RATS. (Eng.) Noguchi, T.; Tokunaga, Y.; Ichikawa, H.; Muranishi, S.; Sezaki, H. (Faculty Pharmaceutical Sciences, Kyoto Univ., Yoshida Shimodachi-cho, Sakyo-ku, Kyoto, Japan). *Chem. Pharm. Bull.* 25(3):413-419; 1977.

3489 THE SIGNIFICANCE OF VEHICLE OIL METABOLISM IN THE ABSORPTION PROCESS OF LIPID-SOLUBLE COMPOUNDS. (Eng.) Noguchi, T.; Taniguchi, K.; Muranishi, S.; Sezaki, H. (Faculty Pharmaceutical Sciences, Kyoto Univ., Yoshida Shimoadachi-cho, Sakyo-ku, Kyoto, Japan). *Chem. Pharm. Bull.* 25(3): 434-440; 1977.

3490 THE EFFECT OF HEAT INACTIVATION OF SOYBEAN TRYPSIN INHIBITOR ON PROTEIN AND LIPID ABSORPTION IN MAN [Abstract]. (Eng.) Linscheer, W. G.; Raheja, K. L. (Veterans Admin. Hosp., Syracuse, NY). *Gastroenterology* 72(5, Part 2):1175; 1977.

3491 CHARACTERIZATION OF THE INDIVIDUAL COMPONENTS OF INTESTINAL FOLATE TRANSPORT [Abstract]. (Eng.) Dhar, G. J.; Selhub, J.; Gay, C.; Rosenberg, I. (Pritzker Sch. Medicine, Univ. Chicago, Chicago, IL). *Gastroenterology* 72(5, Part 2):1049; 1977.

3492 PARTIAL PURIFICATION FROM LIVER PLASMA MEMBRANCE (LPM) OF A PROTEIN COMPONENT POSSIBLY INVOLVED IN ORGANIC ANION TRANSPORT [Abstract]. (Eng.) Tiribelli, C.; Lunazzi, G. C.; Frezza, M.; Sottocasa, G. L. (Istituti di Patologia Medica e Chimica Biologica, Univ. Trieste, Trieste, Italy). *Digestion* 14(5/6):470; 1976.

3493 A NEW METHOD FOR ASSESSING Zn ABSORPTION IN MAN [Abstract]. (Eng.) Aamodt, R. L.; Rumble, W. F.; Johnston, G. S.; Henkin, R. I. (Natl. Inst. Health, Bethesda, MD). *Clin. Res.* 25(3):306A; 1977.

3494 ANTIEPILEPTIC DRUG ABSORPTION FROM RAT JEJUNUM IN VIVO [Abstract]. (Eng.) Tramposch. A.; Abbatiello, E. R.; Pippenger, C. E. (St. John's Univ., Jamaica, NY 11439). *Fed. Proc.* 36(3): 1021; 1977.

3495 EXPERIMENTAL STUDIES ON THE INTESTINAL ABSORPTION OF DIPHENYLHYDANTOINE (DPH) [Abstract]. (Eng.) Johansson, O.; Lindberg, T. (No affiliation given). *Acta Paediatr. Belg.* 29(2): 132; 1976.

3496 DETECTION OF RADIOACTIVE FATTY ACIDS DURING THEIR INTESTINAL ABSORPTION BY THE RAT. (Eng.) Carlier, H. (Laboratoire de Physiologie de la Nutrition U.E.R., Univ. de Dijon, 21000 Dijon, France). *J. Microsc. Biol. Cell.* 27(2/3): 239-242; 1976.

3497 A SPECIFIC ACTION OF ASPIRIN ON GASTRIC CELL MEMBRANE [Abstract]. (Eng.) Koelz, H. R.; Fischer, J.; Sachs, G.; Blum, A. L. (Univ. Hosp. Orthopedics, CH-Zurich, Switzerland). *Gastroenterology* 72(5, Part 2):1082; 1977.

See also, 3588, 3700, 3771, 3782, 3784, 3800, 3811, 3901.

MOTILITY

3498 DYNAMIC RESPONSE CRITERIA FOR FLUID-FILLED ESOPHAGEAL MANOMETERS. (Eng.) Klingler, D. R.; Harell, G. S.; Zboralske, F. F. (Utah Biomedical Test Lab., 520 Wakara Way, Salt Lake City, UT 84108). *Invest. Radiol.* 12(6):515-519; 1977.

To ascertain the predominant frequencies in the peristaltic waveform, a system of two infused fluid-filled manometers was constructed in which each manometer responded in a significantly different manner to sinusoidal pressure fluctuations above 1 Hz in *in vitro* testing. Peristaltic pressure recordings *in vivo* in the distal third of the normal human esophageal body revealed no significant difference in the tracings obtained from the two manometers, indicating that only pressure fluctuations below 1 Hz were significant in determining the shape of normal distal esophageal peristaltic waveforms. Similar methodology may be applied for determining the predominant frequencies in other parts of the normal esophagus and for determining the predominant frequencies in esophageal motility disorders.

3499 ESOPHAGEAL MOTILITY IN THE ELDERLY. (Eng.) Khan, T. A.; Shragge, B. W.; Crispin, J. S.; Lind, J. F. (Univ. Manitoba Health Science Center, 700 William Ave., Winnipeg, Canada R3E 0Z3). *Am. J. Dig. Dis.* 22(12):1049-1054; 1977.

The effect of age on esophageal motility was studied manometrically by comparing 49 asymptomatic subjects over 60 yr of age with 43 similar subjects under 40 yr of age. The resting pressures and the responses to deglutition were recorded in the esophagus, lower esophageal sphincter (LES), and the stomach. Although the pressures in the LES were similar in the two groups, the LES response to deglutition was inadequate in 17.8% of swallows in those over 60 yr of age and in only 5.9% in those under 40 yr ($p<0.003$). Inadequate LES response was characterized by either a complete absence of response or absence of contractile phase. The amplitude of sphincteric response to deglutition was less in older persons, due mainly to a decrease in the amplitude of contraction. In the body of the esophagus the peristaltic contractions were weaker and progressed more slowly in the older group. The incidence of disordered contractions was significantly higher in the older group (25.3% versus 8.2%, $p<0.001$). Spontaneous gastroesophageal reflux was seen in 9 of the 49 subjects over 60 yr of age and in none under 40 yr of age. The changes in swallowing patterns indicate a degree of neuromuscular degeneration. They simulate those seen in neuromuscular esophageal disorders such as diffuse spasm and gastroesophageal reflux. Recognition of the age-related changes is important in interpreting esophageal motility patterns in the elderly.

3500 EFFECT OF ACID ON THE MOTILITY OF THE OESOPHAGUS OF THE PIG WITH EXPERIMENTALLY INDUCED OESOPHAGITIS. (Eng.) Punto, L.; Koivisto, E. (Dept. Diagnostic Radiology, Univ. Oulu, Oulu, Finland). *Scand. J. Gastroenterol.* 12(7):776-780; 1977.

Studies were performed to determine whether an acid contrast medium disturbs motor activity in the pig esophagus that has been damaged with hydrochloric acid. Eight pigs were used, two of them as control. Six animals were fed twice a day with 400 ml of HCl solution (pH 1.2) for 6 weeks. In five animals, a condition resembling esophagitis developed. Prior to the study and at intervals of 2 weeks, simultaneous radiologic and manometric examinations of the esophagus were performed, using the conventional barium sulfate or acid barium sulfate suspension as contrast media in 10-ml bolus doses. In two pigs, esophagoscopy was made three weeks after the test began. With conventional medium, all pigs showed normal peristalsis and pressure recordings of a normal swallowing complex with respect to amplitude, duration, and speed of peristaltic wave. Acid barium sulfate caused spasms and nonperistaltic pressure waves during swallowing of the contrast medium by four of the five pigs with experimental esophagitis, whereas, at the beginning of the experiment, normal peristalsis and swallowing complex had been present in all animals. In one animal, the changes were observed by 2 weeks after the beginning of experiment, while in the others they occurred after 6 weeks. The fact that control pigs did not show any pathological motor disturbances with acid contrast medium indicates that mucosal damage causes the motor disturbances provoked by the medium.

3501 PROSTAGLANDIN E_2 EFFECT ON LOWER ESOPHAGEAL SPHINCTER PRESSURE AND SERUM GASTRIN.

(Eng.) Maher, J. W.; Hollenbeck, J. I.; Crandall, V.; McGuigan, J.; Woodward, E. R. (Coll. Medicine, Univ. Florida, Gainesville, FL 32610). *J. Surg. Res.* 24(2):87-91; 1978.

The effects of 15-methyl analogs of prostaglandin E_2 (15 Me PGE_2) on lower esophageal sphincter pressure (LESP) and serum gastrin levels were studied in six mongrel dogs prepared with slit esophagostomies. After a 2-week recovery period, the dogs underwent three fasting esophageal motility studies, and blood was sampled for serum gastrin determinations. Esophageal motility studies and blood sampling were then repeated at 20, 30, and 40 min following i.v. injection of 15 Me PGE_2 (0.5 μg/kg). Serum gastrin was determined by radioimmunoassay, and LESP was measured as mean end expiratory pressure. Two additional dogs had motility studies repeated with 15 Me PGE_2 in doses 0.05, 0.2, 0.5, and 1.0 μg/kg to construct a complete dose-response curve in which the response was expressed as the change in LESP from basal values. All animals showed an increase in LESP after administration of PGE_2 when compared to the control value (from 29.2 ± 1.3 versus 19.2 ± 1.2 cm H_2O, $p<0.001$), the increase being large and significant ($p<0.005$) in four dogs and small and not significant in two dogs. The two dogs for whom dose-response curves were constructed also showed a large increase in LESP following injection of 15 Me PGE_2 (0.5 μg/kg). There were no differences in the response strength at the different time intervals measured. The LESP increased significantly following the administration of doses of 0.2, 0.5, and 1.0 μg/kg 15 Me PGE_2 while there was no significant increase at 0.05. Serum gastrin levels after administration of 15 Me PGE_2 (0.05 μg/kg) were unchanged from control studies (24.4 ± 5.0 pg/ml versus 16.2 ± 2.4 pg/ml). The studies strongly suggest that inhibition of gastrin release is not the mechanism of action of 15 Me PGE_2 on LESP. The usefulness of the drug as adjuvant therapy in peptic ulcer disease and reflux esophagitis awaits further study.

3502 EFFECT OF Salmonella typhimurium ON MYOELECTRICAL ACTIVITY IN THE RABBIT ILEUM.

(Eng.) Weisberg, P. B.; Carlson, G. M.; Cohen, S. (Sch. Medicine, Univ. Pennsylvania, Philadelphia, PA). *Gastroenterology* 74(1):47-51; 1978.

The small intestinal myoelectrical response to *Salmonella typhimurium* was studied using the ligated ileal loop model in male New Zealand white rabbits. Three strains of *S. typhimurium* were used: strain TML, which causes mucosal damage and increased fluid output; strain M-206, which causes increased fluid output but minimal mucosal damage; and strain LT-7, which causes mucosal damage but no increase in fluid output. Strains TML and M-206 produced groups of abnormal action potential bursts (APBs). An APB was defined as action potential activity by a duration of 1.5 sec or longer occurring in at least two adjacent electrode recording sites. The mean onset time of APB activity was 4.0 ± 0.5 hr after infection with TML and 5.25 ± 0.84 hr after infection with M-206 ($p>0.05$). After onset, the abnormal myoelectrical pattern persisted for the duration of all recording periods (up to 24 hr). Three distinct configurations of APBs were observed: (1) aborad propagation, (2) orad propagation, and (3) less organized bidirectional propagation from the point of origin, termed "splits." All APBs were associated with intestinal contractions. Strain LT-7 did not produce any APBs. Control experiments consisted of recording from noninfected loops, loops injected with sterile saline or sterile culture broth, loops infused with saline at 11.2 ml/hr, and loops infused with 800 mOsm of mannitol at 11.64 ml/hr. APB activity was not observed in any of the control experiments. These data indicate that, in addition to the secretory abnormalities seen in *Salmonella* diarrhea, there is a small intestinal myoelectrical disturbance consisting of abnormal APBs. The myoelectrical disturbance is seen with organisms known to produce increased fluid output, and it apparently occurs independently of the mucosal damage caused by *Salmonella*.

3503 EFFECTS OF ETHANOL ON ELECTRICAL PARAMETERS OF THE IN VIVO RAT STOMACH.

(Eng.) Biggerstaff, R. J.; Leitch, G. J. (Indiana Univ. Sch. Medicine, 8600 Univ. Blvd., Evansville, IN 47712). *Am. J. Dig. Dis.* 22(12):1064-1068; 1977.

The gastric transmural electrical potential difference (PD) and direct-current resistance were measured in the rat *in vivo* under conditions in which the luminal pH was controlled over the pH range 1.0 to 12.0. Raising the pH above 11.0 caused a reduction in both PD and resistance. This result is consistent with basic groups limiting cation permeability through the mucosa. Exposure of the mucosa to 20% ethanol caused a reduction in resistance, PD, and H^+ secretion, and an increased appearance of Na^+ in the lumen at neutral pH. The pH dependence of the resistance at high pH values was also eliminated, consistent with the elimination or bypassing of channels containing basic groups. Mucosal exposure to 8.5% ethanol reduced the PD and H^+ secretion without affecting resistance. Exposing the mucosa to a sucrose solution (1.2 M) that approximated the effective osmolarity of the 8.5% ethanol showed that the net Na^+ flux effect of this concentration of alcohol was probably due to its hyperosmolarity. Both the reduced PD and H^+ secretion seen with the alcohol solution, but not with the sucrose, indicated that the active transport inhibition by this concentration of alcohol was probably a direct effect of the ethanol.

3504 INHIBITORY EFFECT OF PENTAGASTRIN AND FEEDING ON NATURAL AND MOTILIN-INDUCED INTERDIGESTIVE CONTRACTIONS IN THE STOMACH OF CONSCIOUS DOGS. (Eng.) Itoh, Z.; Takeuchi, S.; Aizawa, I.; Couch, E. F. (Gunma Univ. Sch. Medicine, Maebashi, 371 Japan). *Gastroenterol. Jpn.* 12(4): 284-288; 1977.

The interaction between motilin, pentagastrin, and feeding was investigated during the interdigestive gastric motor state in four healthy conscious dogs. The i.v. infusion of synthetic motilin always induced a pattern identical with that of the naturally occurring interdigestive stomach contractions. Pentagastrin completely inhibited the interdigestive contractions at doses of 0.2-1.6 μg/kg/hr; this inhibition was dose-related to the occurrence of the motilin-induced contractions. Food ingestion strongly inhibited both the naturally occurring contractions and the motilin-induced contractions. These findings support the hypothesis that the interdigestive contractions in the dog are, at least in part, controlled by motilin.

3505 MANOMETRIC AND ELECTROMYOGRAPHIC STUDIES OF THE UPPER ESOPHAGEAL SPHINCTER [Abstract]. (Eng.) Asoh, R.; Goyal, R. K. (Univ. Texas Health Science Center, Dallas, TX). *Gastroenterology* 72(5, Part 2):1025; 1977.

3506 FORCE-LENGTH RELATIONSHIPS OF THE LOWER ESOPHAGEAL SPHINCTER (LES) [Abstract]. (Eng.) Biancani, P.; Kerstein, M. D.; Weiss, R. M.; Behar, J. (Yale Univ., New Haven, CT 06510). *Fed. Proc.* 36(3):462; 1977.

3507 TERTIARY CONTRACTIONS OF THE ESOPHAGUS: A MANOMETRIC STUDY IN HEALTHY SUBJECTS [Abstract]. (Eng.) Orlando, R. C.; Bozymski, E. M.; Blaylock, N. B. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC). *Gastroenterology* 72 (5, Part 2):1109; 1977.

3508 THE MYOGENIC ACTIVE TENSION THAT DEFINES LOWER ESOPHAGEAL SPHINCTER IS AEROBIC [Abstract]. (Eng.) Templeman, D. C. (Dept. Medicine, Univ. Iowa, Iowa City, IA). *Gastroenterology* 72(5, Part 2):1189; 1977.

3509 THE SIGNIFICANCE OF LOWER ESOPHAGEAL SPHINCTER PRESSURE ASYMMETRY IN MAN AND ITS CORRELATION WITH A NEW MEASURE OF CLOSURE STRENGTH [Abstract]. (Eng.) Luckmann, K.; Welch, R. W. (Univ. Texas Health Science Center, San Antonio, TX). *Gastroenterology* 72(5, Part 2):1091; 1977.

3510 NEURAL CONTROL OF LOWER ESOPHAGEAL SPHINCTER (LES) CLOSURE [Abstract]. (Eng.) Behar, J.; Kerstein, M.; Biancani, P. (Dept. Medicine, Brown Univ., Providence, RI 02902). *Gastroenterology* 72(5, Part 2):1029; 1977.

3511 EFFECTS OF GRADED DOSES OF ALCOHOL UPON ESOPHAGEAL AND LOWER ESOPHAGEAL SPHINCTER (LES) FUNCTION [Abstract]. (Eng.) Mayer, E. M.; Grabowski, C. J.; Fisher, R. S. (Temple Univ. Medical Sch., Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1099; 1977.

3512 EFFECT OF PHARMACOLOGIC AGENTS ON PRIMARY ESOPHAGEAL PERISTALSIS IN THE OPOSSUM [Abstract]. (Eng.) Dodds, W. J.; Christensen, J.; Wood, J.; Arndorfer, R. C. (Medical Coll. Wisconsin, Milwaukee, WI). *Gastroenterology* 72(5, Part 2): 1050; 1977.

3513 HISTAMINE PHARMACOLOGY OF THE LOWER ESOPHAGEAL SPHINCTER [Abstract]. (Eng.) Brown, F. C.; Dubois, A.; Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD). *Clin. Res.* 25(3):466A; 1977.

3514 ROLE OF HISTAMINERGIC RECEPTORS IN THE CONTROL OF HUMAN LOWER ESOPHAGEAL SPHINCTER (LES) FUNCTION [Abstract]. (Eng.) Kravitz, J. J.; Snape, W. J., Jr.; Cohen, S. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1084; 1977.

3515 LOWER ESOPHAGEAL SPHINCTER PRESSURE (LESP) RESPONSE TO INTRAVENOUS INFUSIONS OF PENTAGASTRIN (PG) [Abstract]. (Eng.) Corazziari, E.; Pozzessere, C.; Dani, S.; Delle Fave, G. F.; De Magistris, L.; Anzini, F. (II Clinica Medica, Universita di Roma, Roma, Italy). *Gastroenterology* 72(5, Part 2):1041; 1977.

3516 THE EFFECT OF SMOKING ON ESOPHAGEAL PERISTALSIS [Abstract]. (Eng.) Chernow, B.; Brown, F. C.; Castell, D. O. (Natl. Naval Medical Center, Bethesda, MD 20014). *Gastroenterology* 72(5, Part 2):1038; 1977.

3517 SIMULTANEOUS RECORDING OF GASTRIC AND DUODENAL ELECTRICAL ACTIVITY (ELECTROGASTROGRAPHY) [Abstract]. (Eng.) Civalero, L. A.; Kantelius, M.; Nilsson, B. Y. (No affiliation given). *Electroencephalogr. Clin. Neurophysiol.* 43(3):444; 1977.

3518 SEMICONDUCTOR STRAIN GAUGE SENSING AND TELEMETERING OF GASTRIC MOTILITY IN GREAT-HORNED OWLS [Abstract]. (Eng.) Fuller, M. R.; Duke, G. E.; Kuechle, V. B. (Coll. Veterinary Medicine, Univ. Minnesota, St. Paul, MN 55108). *Fed. Proc.* 36(3):462; 1977.

3519 MECHANICAL CHARACTERISTICS OF THE PYLORUS [Abstract]. (Eng.) Biancani, P.; Zabinski, M. P.; Behar, J. (Yale Univ., New Haven, CT 06510). *Gastroenterology* 72(5, Part 2):1029; 1977.

3520 PHYSIOLOGIC EFFECTS OF CCK AND CCK OCTAPEPTIDE ON THE MECHANICAL AND INTRACELLULAR ELECTRICAL ACTIVITY OF CANINE ANTRAL CIRCULAR MUSCLE [Abstract]. (Eng.) Morgan, K. G.; Schmalz, P. F.; Go, V. L. W.; Szurszewski, J. H. (Mayo Medical Sch., Rochester, MN). *Gastroenterology* 72(5, Part 2): 1105; 1977.

3521 ISOLATED GASTRIC MUSCLE CELLS: DEMONSTRATION OF THE DIRECT MYOGENIC EFFECT OF CHOLECYSTOKININ [Abstract]. (Eng.) Bitar, K. N.; Zfass, A. M.; Farrar, J. T.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA). *Gastroenterology* 72(5, Part 2):1030; 1977.

3522 HISTAMINE$_2$ RECEPTOR INVOLVEMENT IN THE REGULATION OF GASTRIC EMPTYING [Abstract]. (Eng.) Dubois, A.; Hamilton, B.; Castell, D. O. (Uniformed Services, Univ. Health Sciences, Bethesda, MD). *Gastroenterology* 72(5, Part 2):1051; 1977.

3523 CYCLIC CHANGES IN PLASMA MOTILIN LEVELS AND INTERDIGESTIVE MYOELECTRIC ACTIVITY OF CANINE ANTRUM AND DUODENUM [Abstract]. (Eng.) Lee, K. Y.; Chey, W. Y.; Tai, H. H.; Wagner, D.; Yajima, H. (Genesee Hosp., Rochester, NY). *Gastroenterology* 72(5, Part 2):1162; 1977.

3524 DROP IN GASTRIC POTENTIAL DIFFERENCE AFTER PENTAGASTRIN UNRELATED TO OXYNTIC CELL STIMULATION [Abstract]? (Eng.) Tarnawski, A.; Krause, W.; Ivey, K. J. (Veterans Admin. Hosp., Columbia, MO). *Gastroenterology* 72(5, Part 2): 1139; 1977.

3525 TRANSMUCOSAL POTENTIAL DIFFERENCE IN RAT UPPER GASTROINTESTINAL TRACT. A SIMPLE MODEL SIMILAR TO HUMAN STUDIES [Abstract]. (Eng.) Tarnawski, A.; Ivey, K. J. (Veterans Admin. Hosp., Columbia, MO). *Gastroenterology* 72(5, Part 2): 1138; 1977.

3526 SMALL BOWEL MOTILITY PATTERNS IN HUMANS FOLLOWING ORALLY ADMINISTERED ANTI-DIARRHEAL DRUGS [Abstract]. (Eng.) Friedman, G.; Korsten, M. (Mt. Sinai Sch. Medicine, New York, NY). *Gastroenterology* 72(5, Part 2):1059; 1977.

3527 THE TWO MUSCLE LAYERS OF DUODENUM DIFFER IN RESPONSE TO PARASYMPATHOMIMETIC DRUGS, HISTAMINE, AND SUBSTANCE P [Abstract]. (Eng.) Faulk, D.; Anuras, S.; Christensen, J. (Univ. Iowa Hosp., Iowa City, IA). *Gastroenterology* 72(5, Part 2):1057; 1977.

3528 ENHANCEMENT BY PHYSALAEMIN OF THE CONTRACTIONS INDUCED BY CHOLINOMIMETICS IN THE GUINEA-PIG ILEUM [Letter to Editor]. (Eng.) Fontaine, J.; Famaey, J. P.; Reuse, J. (Inst. Pharmacy, Univ. Burssels, Campus Plaine CP 205/7, Boulevard du Triomphe, 1050, Brussels, Belgium). *J. Pharm. Pharmacol.* 29(7):449-450; 1977.

3529 OUABAIN-SENSITIVE CONTRACTILE RESPONSE TO 13-NORLEUCINE MOTILIN OF RABBIT DUODENAL MUSCLE [Abstract]. (Eng.) Ruppin, H.; Riemer, J.; Mayer, C. J.; Kolling, K.; Domschke, W.; Wunsch, E.; Demling, L. (Dept. Physiology, Univ. Munchen, Munich, W. Germany). *Gastroenterology* 72(5, Part 2): 1123; 1977.

3530 INTRACELLULAR RECORDINGS OF SLOW WAVES FROM INFLAMED SMOOTH MUSCLE OF THE COLON [Abstract]. (Eng.) Duff, W. M. (Univ. Utah Medical Center, Salt Lake City, UT). *Gastroenterology* 72 (5, Part 2):1052; 1977.

3531 EFFECT OF DIPYRIDAMOLE AND 6-(2-HYDROXY-5-NITRO)-BENZYLTHIOGUANOSINE ON LOW-FREQUENCY-STIMULATED RELAXATION IN THE GUINEA PIG TAENIA COLI. (Eng.) Baer, H. P.; Frew, R.; Burnstock, G. (Dept. Pharmacology, Univ. Alberta, Edmonton, Alberta, T6G 2H7, Canada). *Can. J. Physiol. Pharmacol.* 55(3):394-398; 1977.

3532 REGULATION OF COLONIC MOTILITY AND BLOOD FLOW. (Eng.) Hulten, L. (Sahlgrens Hosp., S-413 45 Goteborg, Sweden). *Nutr. Rev.* 35(3):38-41; 1977.

3533 ELECTRICAL ACTIVITY OF GANGLION CELLS IN THE CELIAC PLEXUS OF THE GUINEA PIG [Abstract]. (Eng.) Kreulen, D. L.; Szurszewski, J. H. (Mayo Medical Sch., Rochester, MN 55901). *Fed. Proc.* 36(3):462; 1977.

3534 GASTROINTESTINAL PROKINETIC AND ANTI-EMETIC EFFECTS OF A NEW SUBSTITUTED PYRIMIDINE, O 6553 (2-METHYLAMINO-4-N-METHYLPIPERAZINO-5-THIOMETHYL-6-CHLOROPYRIMIDINE HYDROCHLORIDE). (Eng.) Loiseau, G.; Millischer, R.; Donadieu, A. M.; Marquet, J. P. (Recherche et Pharmacie, Groupe Pharmuka, 35, quai du Moulin de Cage, F-92231 Gennevilliers, France). *Drug Res.* 27(I, 3):606-611; 1977.

3535 EFFECTS OF THE SPHINCTER OF ODDI AND DUODENAL MOTILITY UPON FLOW THROUGH THE BILE DUCT [Abstract]. (Eng.) Scott, G. W.; Broughton, A. C. (Surgical Medical Res. Inst., Univ. Alberta, Edmonton, Alberta T6G 2N8, Canada). *Eur. Surg. Res.* 9(Suppl. 1):156; 1977.

See also, 3475, 3568, 3597, 3615, 3793, 3801, 3811, 3859, 3860, 3890, 3967, 3968, 4007, 4176.

3536 THE ROLE OF CALCIUM IN PAROTID AMYLASE SECRETION EVOKED BY EXCITATION OF CHOLINERGIC, α- AND β-ADRENERGIC RECEPTORS. (Eng.) Petersen, O. H.; Ueda, N.; Hall, R. A.; Gray, T. A. (Asahikawa Univ. Sch. Medicine, Asahikawa, Japan). *Pfluegers Arch.* 372(2):231-237; 1977.

Amylase output from superfused mouse parotid segments was monitored by an on-line automated fluorometric method. During exposure to Ca^{2+}-free solution containing 10^{-4} M EGTA (ethylene glycol-bis-[β-amino ethyl ether]), excitation of α-adrenoceptors or cholinergic receptors only resulted in a very small and transient increase (<10%) in amylase output. Admission of Ca^{2+} during sustained stimulation caused a marked, sustained rise in amylase output. During exposure to Ca^{2+}-free solution containing EGTA, excitation of β-adrenoceptors caused the usual marked rise in amylase output and the enhanced amylase secretion was sustained. Admission of Ca^{2+} during sustained isoproterenol stimulation only caused a small transient rise in amylase output. The effect of acetylcholine (ACh) on amylase output varied with the extracellular Ca^{2+} concentration, being reduced at subnormal extracellular levels and enhanced during superfusion with fluid containing 20 mM Ca^{2+}. Mn^{2+} (5 mM) acted as a stimulant of amylase secretion even in the presence of blocking agents for the cholinergic, α-, and β-adrenergic receptor sites. The effect of Mn^{2+} was biphasic; an initial transient increase in amylase output was followed by a slowly developing sustained increase in secretion. The initial response was abolished after pretreatment with EGTA in a Ca^{2+}-free solution. Adding 5 mM Mn^{2+} just after the addition of ACh had caused maximal amylase secretion resulted in an immediate reduction in amylase output. Adding Mn^{2+} and ACh simultaneously to the superfusion solution resulted in a response smaller than that expected for ACh alone. The effect of ACh during continued exposure to Mn^{2+} was greatly reduced compared to control conditions. Stimulation with Mn^{2+} during continued exposure to isoproterenol resulted in a marked transient increase in amylase output. The action of stimulants exciting cholinergic and α-adrenergic receptors is entirely dependent on extracellular Ca^{2+}, whereas the action of stimulants exciting adrenergic β-receptors is relatively independent of Ca^{2+}. Mn^{2+} immediately inhibits ACh-evoked amylase secretion probably by reducing Ca^{2+} influx. Mn^{2+} is, however, also a stimulant of amylase secretion, probably by displacement of membrane-bound cell Ca^{2+}.

3537 CHARACTERIZATION OF GLYCOSPHINGOLIPIDS OF RAT SUBLINGUAL AND SUBMAXILLARY GLANDS [Abstract]. (Eng.) Slomiany, B. L.; Slomiany, A. (New York Medical Coll., Valhalla, NY 10595). *Adv. Exp. Med. Biol.* 89:520-521; 1977.

3538 HORMONAL CONTENT OF COMMERCIAL PREPARATIONS OF CHOLECYSTOKININ-PANCREOZYMIN [Abstract]. (Eng.) Oliver, J. M.; Harvey, R. F. (Bristol Royal Infirmary, Bristol, England). *Gut* 18(11):A982; 1977.

3539 THE EFFECT OF IN UTERO PROTEIN MALNUTRITION AND SUBSEQUENT RENUTRITION ON RAT SALIVA AND SOME SALIVARY ENZYMES. (Eng.) Watson, R. R. (Indiana Univ. Sch. Medicine, 1100 W. Michigan St., Indianapolis, IN 46202). *Br. J. Nutr.* 38(2): 233-238; 1977.

3540 IN VITRO TECHNIQUES FOR STUDIES ON PITUITARY REGULATION OF RAT LIVER ENZYMES. (Eng.) Stenberg, A.; Eneroth, P.; Gustafsson, J. A.; Skett, P. (Karolinska Institutet, S-104 01 Stockholm, Sweden). *J. Steroid Biochem.* 8(5): 603-607; 1977.

3541 HORMONAL CONTROL OF THE SPHINCTER OF ODDI. (Eng.) Rey, J. F.; Harvey, R. F. *In: The Sphincter of Oddi.* Edited by J. Delmont. (Basel: S. Karger): 66-71; 1977.

3542 SOMATOSTATIN-LIKE IMMUNOREACTIVITY IN GASTRODUODENAL MUCOSA IN MAN [Abstract]. (Eng.) Chayvialle, J. A. P.; Bouhours, D.; Bernard, C.; Lambert, R. (INSERM, U 45, Pav. H bis, Hopital Edouard-Herriot, 69374 Lyon, France). *Digestion* 16(1/2):206-207; 1977.

3543 SECRETORY POTENTIALS EVOKED BY SYMPATHETIC STIMULATION OF THE PAROTID GLAND OF CAT [Abstract]. (Eng.) Thesleff, P.; Emmelin, N.; Grampp, W. (Dept. Physiology, Biophysics, Univ. Lund, Lund, Sweden). *Acta Physiol. Scand.* 102(1): 16A-17A; 1978.

3544 DEPENDENCE OF SALIVARY SECRETION, PASSIVE AND ACTIVE POTASSIUM TRANSPORT ON FLOW RATE IN THE PERFUSED SUBMANDIBULAR GLAND [Abstract]. (Eng.) Laugesen, L. P.; Nielsen, J. O. D.; Poulsen, J. H. (Inst. Medical Physiology, Univ. Copenhagen, Copenhagen, Denmark). *Acta Physiol. Scand.* 102(1): 19A-20A; 1978.

See also, 3480, 3481, 3778, 3813, 4062, 4086.

SECRETION AND METABOLISM

Stomach

3545 STIMULI FOR INTESTINAL PHASE OF GASTRIC SECRETION IN DOGS.

(Eng.) Konturek, S. J.; Radecki, T.; Kwiecien, N. (Medical Acad., Krakow, Poland). *Am. J. Physiol.* 234(1):E64-E69; 1978.

In four dogs with a special gastroduodenal fistula that allowed complete separation of the stomach and the duodenum, various food chemicals (albumin, liver extract, amino acid mixture, individual amino acids, carbohydrate, fat, and saline) were instilled into the duodenum, and their ability to stimulate gastric acid and serum gastrin secretion were compared. The liver extract meal was the most effective stimulant of both gastric acid and serum gastrin secretion, whereas albumin and the amino acid mixture (made up to simulate the amino acid composition of albumin or liver extract) were less potent stimulants. The i.v. administration of the amino acid mixture was also an effective stimulant of gastric acid secretion but not of serum gastrin. Individual amino acids, instilled intraduodenally in 50 mM solutions, varied in stimulatory activity; the most active were serine, proline, glycine, leucine, and valine, whereas tyrosine, cysteine, aspartic acid, histidine, and tryptophan did not cause a significant increase of gastric acid secretion over saline control. L-isomers of the most active amino acids produced significantly greater acid outputs than did their D-isomers. The carbohydrate and fat meals in the intestine were ineffective in stimulation of gastric secretion. The results indicate that protein and its digestive products, peptides and amino acids, are stimulants of the intestinal phase of gastric secretion and that this stimulation involves release of gastrin, the direct action of the absorptive products on the oxyntic glands, and perhaps other mechanisms.

3546 MEASUREMENT OF GASTRIC ACID SECRETION IN ISOLATED GASTRIC MUCOSA OF THE RAT: EFFECTS OF SECRETAGOGUES AND INHIBITORS INCLUDING CYCLIC ADENOSINE MONOPHOSPHATE RELATED AGENTS AND AN H_2-RECEPTOR ANTAGONIST.

(Eng.) Watanabe, K.; Watanabe, H. Y.; Goto, Y.; Kariya, Y. (Dept. Pharmacometrics, Res. Inst. Wakan-yaku, Univ. Yoyama, Japan). *Chem. Pharm. Bull. (Tokyo)* 25(8):1934-1940; 1977.

An improved, reproducible, and sensitive method, which is a modification of the open stomach preparation of rats, for the measurement of gastric acid secretion in isolated rat gastric mucosa was used to measure the effects of certain secretagogues and antisecretory drugs in this system. This technique differs from the open stomach procedure by using immature rats that are not fasted before the experiment, by eliminating the stomach muscle layer, and by setting the pH-stat at 4.0. Dose-dependent acid secretory responses were obtained to all the tested secretagogues in the following dose ranges: 10^{-6}-10^{-4} g/ml histamine, 3×10^{-8}-3×10^{-6} g/ml bethanecol, 3×10^{-6}-6×10^{-5} g/ml tetragastrin, and 10^{-5}-10^{-3} g/ml dibutyryl cyclic AMP (DBcAMP); however, the maximum response to tetragastrin was always less as compared with that of other secretagogues. The effects of atropine (10^{-6} g/ml), metiamide (10^{-4} g/ml), Dibucaine (10^{-4} g/ml), sodium thiocyanate (10^{-3} g/ml), and 2,4-dinitrophenol (2,4-DNP, 10^{-4} g/ml) on acid secretion stimulated by bethanecol (10^{-6} g/ml), tetragastrin (10^{-5} g/ml), histamine (1×10^{-5} g/ml), and dibutyryl cyclic AMP DBcAMP (10^{-4} g/ml), were studied. Atropine achieved a significant inhibition ($p<0.01$) only against the action of bethanecol. Dibucaine and sodium thiocyanate strongly inhibited ($p<0.01$) the action of all the secretagogues. Metiamide significantly inhibited ($p<0.01$) the action of histamine and tetragastrin but only partially depressed ($p<0.05$) the action of bethanecol and was ineffective against DBcAMP. 2,4-DNP abolished the sensitivity of the gastric mucosa to all secretagogues ($p<0.01$) and even blocked basal secretion. Cyclic AMP (10^{-3} g/ml), cyclic guanosine monophosphate (cGMP, 10^{-4} g/ml), and DBcGMP (10^{-4} g/ml) failed to stimulate acid secretion, whereas theophylline (10^{-3} g/ml) gave a marked stimulation of acid output (change=1,200 ± 202 mμEq H^+/10 min) in tests to examine cyclic nucleotides other than DBcAMP. Imidazole (10^{-3} g/ml) significantly inhibited the action of bethanecol, histamine, and DBcAMP ($p<0.05$) and the action of tetragastrin ($p<0.01$). DBcGMP was ineffective as an antagonist of acid secretion and the results with prostaglandin E_1 (4×10^{-6} and 2×10^{-5}) were largely inconclusive except for inhibitory action against histamine ($p<0.05$).

3547 METABOLISM OF DOG GASTRIC MUCOSA: LEVELS OF GLYCOLYTIC, CITRIC ACID CYCLE AND OTHER INTERMEDIATES.

(Eng.) Sarau, H. M.; Foley, J. J.; Moonsammy, G.; Sachs, G. (Smith, Kline and French Lab., Philadelphia, PA 19101). *J. Biol. Chem.* 252(23):8572-8581; 1977.

Metabolites of glycolysis, the citric acid cycle, the hexose monophosphate shunt, glutamate, aspartate, and coenzyme A (CoA) were measured in defined parietal cell-enriched freeze-dried sections of dog gastric biopsies derived from nonsecreting and secreting tissue. In addition, NH_3, ribulose-5-phosphate, glycerol, and succinate were measured in perchloric acid extracts of biopsies. The onset of secretion increased the level of glycolytic intermediates including pyruvate and lactate with the most marked increase being in fructose-1,6-diphosphate levels (181%). The level of 6-phosphogluconate and ribulose-5-phosphate also increased (by 117% and 64%, resp.), in spite of a constant $NADP^+$/NADPH ratio. The levels of all the citric acid cycle intermediates measured also rose, the most marked increases being in malate and fumarate (by 136% and 183%, resp.). The levels of glycerol, acetyl-CoA, and CoA increased, but the ratio of the latter intermediates remained constant. Calculation of the ratio of the oxidized to reduced form of diphosphopyridine nucleotide indicated a fall of the ratio in the cytoplasm and a rise in the mitochondria. It is concluded that the major energy source for acid secretion is due to an increase in citric acid cycle activity and that glycolysis, and probably also fatty acid oxidation, is stimulated to provide mitochondrial substrate.

3548 EFFECT OF pH OF GASTRIC AND INTESTINAL MEALS ON GASTRIC ACID AND PLASMA GASTRIN AND SECRETIN RESPONSES IN THE DOG.

(Eng.) Konturek, S. J.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX 77550). *Am. J. Physiol.* 233(6):E537-E543; 1977.

Studies were carried out in conscious dogs to determine the relationship between gastric acid secretion and changes in serum concentrations of gastrin and secretin in response to a meal at varying pH levels, when the meal was either confined to the stomach or perfused into the duodenum. In five dogs provided with a special cannula that allowed complete separation of the stomach and the duodenum, a 10% liver extract (LE) meal adjusted to pH levels ranging from 7 to 2 was introduced either into the stomach (gastric phase) or duodenum (intestinal phase). The LE meal (pH 7) in the stomach evoked an acid response equal to 75% of the maximal response to histamine; gastrin rose to about 230 pg/ml above the basal level. Acidification of the LE meal in the stomach resulted in a pH-dependent reduction in acid output and in gastrin levels; at pH 2, acid output was reduced by 85% and gastrin by 50%. Secretin was not changed by LE in the stomach at any pH. The LE meal (pH 7) in the duodenum stimulated gastric acid output to 30% of the histamine maximum and serum gastrin to about 40 pg/ml above the basal level. Acidification of the LE meal in the duodenum caused a pH-dependent fall in acid output, and, at pH 2, both acid output and gastrin level fell to the basal level. Conversely, secretin showed a pH-dependent increase, reaching 150 pg/ml above basal value at pH 2. Infusions of graded doses of secretin (0.25-2.0 U/kg/hr) during gastric or intestinal stimulation mimicked gastric acid and serum hormonal changes seen during duodenal acidification. In the intact stomach with undisturbed neural connections to the duodenum, a gastric LE meal was about three times as potent in stimulating gastric acid and serum gastrin release as an intestinal LE meal. Acidification of the LE meal produced inhibition of gastric acid output accompanied by a pH-dependent suppression of gastrin release in the gastric phase and a pH-dependent elevation of secretin release in the intestinal phase, but the decrease in gastrin and the increase in secretin do not fully account for the decreased acid secretion.

3549 EFFECT OF INDOMETHACIN AND ASPIRIN ON GASTRIC BLOOD FLOW AND ACID SECRETION.

(Eng.) Gerkens, J. F.; Shand, D. G.; Flexner, C.; Nies, A. S.; Oates, J. A.; Data, J. L. (Clinical Pharmacology, Vanderbilt Univ., Nashville, TN 37232). *J. Pharmacol. Exp. Ther.* 203(3):646-652; 1977.

The effect of indomethacin and aspirin on basal and pentagastrin-stimulated gastric blood flow and acid secretion was studied in two groups of pentobarbital-anesthetized dogs. In group I, blood flow was measured with an electromagnetic flow probe around the left gastric artery. Indomethacin (8 mg/kg, i.v.) and aspirin (100 mg/kg, i.v.) reduced basal blood flow by 45% and 26%, resp., but did not change the small basal acid output. Both drugs increased blood pressure. Infusions of pentagastrin (0.025-0.5 µg/kg/min) stimulated acid output and increased blood flow. Indomethacin, injected during the pentagastrin infusion, further increased acid output by a peak of 266%, and reduced blood flow by 43%. Aspirin increased acid output by 104% and reduced blood flow by 39%. In group II, blood flow to different parts of the stomach and small intestine was measured using radioactive microspheres. Pentagastrin infusion increased blood flow in the antrum (30%), fundus (76%), and cardia (45%), and indomethacin (1 hr after starting pentagastrin) reduced total gastric blood flow by 45% to below control levels, all regions being affected. The gastric mucosal and muscular layers were separated and 90% of total flow was to the mucosa. The increase in blood flow produced by pentagastrin and the decrease produced by indomethacin both occurred in the mucosa while muscular blood flow was not altered. Pentagastrin also increased blood flow in the duodenum, jejunum, and ileum, and indomethacin counteracted these increases but did not reduce flow below control. In group III, gastric arterial blood flow was increased by intra-arterial infusions of sodium arachidonate. Indomethacin and aspirin reduced these increases by 72% and 60%, resp. It is concluded that the reduction in mucosal blood flow and potentiation of stimulated acid output by indomethacin and aspirin may be a consequence of prostaglandin synthesis inhibition and that these actions may contribute to the ulcerogenic effect of these drugs.

3550 PROTECTIVE EFFECT OF CIMETIDINE ON ASPIRIN-INDUCED GASTRIC MUCOSAL DAMAGE.

(Eng.) MacKercher, P. A.; Ivey, K. J.; Baskin, W. N.; Krause, W. J. (Harry S Truman Memorial Veterans Hosp., Columbia, MO 65201). *Ann. Intern. Med.* 87(6):676-679; 1977.

The effect of cimetidine on aspirin-induced alterations in gastric mucosa was studied in five normal men. Aspirin effects were studied with and without previous treatment with cimetidine. The mean basal potential difference was -48 ± 1 mV. After 600 mg of aspirin p.o. in 1 dl of isotonic saline, the potential difference decreased in 10 min to -39 ± 1 mV ($p<0.001$) and returned to baseline within 60 min. Control biopsies showed 2% damaged mucosal cells compared with 20% damaged at the time of the maximal drop in potential difference ($p<0.001$) after aspirin. Recovery to 9% damage occurred by 60 min. In subjects pretreated p.o. with 300 mg cimetidine, the potential difference rose during 1 hr to -62 ± 1 mV ($p<0.001$). After aspirin potential difference fell to -48 ± 1 mV compared with -39 ± 1 mV with aspirin alone ($p<0.01$) and returned to -62 ± 1 mV at 60 min. The cimetidine-treated group showed 4% mucosal damage at the peak potential difference fall after aspirin, significantly less ($p<0.02$) than in the untreated subjects. The results indicate that cimetidine protects against aspirin-induced mucosal damage, mainly via decreased acid secretion.

3551 THE EFFECT OF INTESTINAL FAT ON HISTAMINE-STIMULATED GASTRIC SECRETION. (Eng.)

Wazna, M. F.; Stein, T.; Wise, L. (Long Island Jewish-Hillside Medical Center, New Hyde Park, New York, NY 11040). *J. Surg. Res.* 23(6):415-421; 1977.

The effect of intraduodenal fat infusion at a physiologic concentration (40 ml; 2 ml/min during first 10 min, 1 ml/min for the remaining 20 min) on histamine-stimulated gastric acid secretion was studied in female dogs with Heidenhain pouches. The dogs received histamine phosphate i.v. at a rate of 0.04 mg/kg/hr. There was a significant inhibition of acid output after fat administration (from 1.3 ± 0.1 to 0.5 ± 0.07 mEq/15 min, $p<0.001$), but there was no significant change in acid concentration. This result suggests that intraduodenal fat infusion inhibits gastric water secretion to the same extent as it inhibits gastric acid secretion. Histamine caused a marked initial increase in pepsin output ("washout" effect), followed by a secondary sustained increase. The intraduodenal administration of fat abolished the secondary increase in pepsin secretion. The depressant effect of intraduodenal fat on gastric acid and pepsin secretion may play a significant role in the prevention of peptic ulceration.

3552 CHARACTERIZATION OF ANTRAL GASTRIN CELLS WITH REGION-SPECIFIC ANTISERA. (Eng.)

Larsson, L. I.; Rehfeld, J. F. (Inst. Medical Biochemistry, Univ. Aarhus, Aarhus, Denmark). *J. Histochem. Cytochem.* 25(12):1317-1321; 1977.

Region-specific gastrin and cholecystokinin antisera are described. These antisera were used to characterize antral gastrin cells of mammalian (pig, dog, cat, rat) and submammalian (chicken, frog) species. A number of gastrin antisera, which in radioimmunoassay systems showed no or negligible cross-reactivity towards the structurally and functionally related peptide cholecystokinin, were found to react with both gastrin and cholecystokinin cells when used for immunocytochemistry. This discrepancy was shown to be due either to reactivity against a COOH-terminal region common to gastrin and cholecystokinin or to the occurrence of heterogenous antibody populations in the antisera. By differential absorptions, the latter type of antisera was rendered specific for gastrin. Antisera reactive against the NH_2-terminal, middle, or COOH-terminal regions of human heptadecapeptide gastrin were prepared and, together with a specific cholecystokinin antiserum, used for the characterization of antral gastrin cells of the different species. The results indicate that only the COOH-terminal region of gastrin is conserved during evolution.

3553 THE EFFECT OF GIH AND BOOTS SECRETIN AND CHOLECYSTOKININ ON DUODENAL ULCERS IN THE RAT. (Eng.)

Joffe, S. N.; Ferrie, M. M. (Royal Infirmary, Glasgow, G4 OSF, Scotland). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):458-461; 1977.

The efficacy of preparations of secretin, cholecystokinin, and pancreozymin made by the Gastrointestinal Hormone Laboratory (GIH) or by Boots Pharmaceuticals in experimental duodenal ulcers was studied in 140 male Wistar rats. The rats were divided into six treatment groups: (I) 18 ml of saline (150 mmol) infused s.c. over 24 hr, (II) pentagastrin (4 µg/kg/min) and carbachol (0.8 µg/kg/min) in 18 ml of saline infused over 24 hr, (III) GIH secretin (0.125-1.00 clinical U/kg/hr) in 18 ml saline alone (a) or with pentagastrin and carbachol (b), (IV) Boots secretin (1-10 Crick-Harper-Raper [CHR] U/kg/hr) as in (a) or (b) above, (V) GIH cholecystokinin-pancreozymin (CCK-PZ, 1 Ivy-Dog U/kg/hr) as in (a) or (b) above, and (VI) Boots pancreozymin (1 CHR U/kg/hr) as in (a) or (b) above. After the experiment the animals were killed and the severity of lesions was graded on a scale from 0 to 6. Neither stomach nor duodenum mucosal changes were observed in groups I, III(a), IV(a), V(a), and VI(a). All rats from group II developed duodenal ulcers that had penetrated or perforated the serosa (grade 6). When GIH secretin was infused in a dose of 0.125 U/kg/hr with gastric secretagogues, the incidence of the ulcers was similar to that in rats given pentagastrin and carbachol alone. With increasing doses of GIH secretin, the incidence and severity of the secretagogue-induced lesions decreased, so that at 1 U/kg/hr, only 1/12 rats developed an ulcer. Boots secretin in doses 1-10 CHR U/kg/hr infused with the secretagogues had no protective effect. The Boots secretin was shown to be contaminated with CCK. Both GIH CCK-PZ and Boots pancreozymin, in combination with the secretagogues, produced a 100% incidence of duodenal ulcers, which were of greater severity and number than in the rats given the gastric secretagogues alone. In both clinical and laboratory studies, the hormone preparation used should be carefully considered to avoid the effect of contaminants.

3554 STUDIES ON GASTRIC MUCOSAL IgA: SEPARATION OF IMMUNOGLOBULIN RICH FRACTION FROM GASTRIC MUCOPROTEINS. (Eng.)

Spohn, M.; McColl, I. (Guy's Hosp. Medical Sch., London SE1 9RT, England). *Biochem. Biophys. Res. Commun.* 79(3):837-842; 1977.

Human gastric mucosal scrapings were subjected to fractionation on an isopycnic CsCl gradient to investigate the distribution of IgA of human gastric mucus and to compare it with the distribution of mucoproteins. IgA was found between the 5th and 10th ml from the top of the tube (total volume, 12 ml). After twofold fractionation, the combined IgA-containing fraction accounted for 4-7% of the total carbohydrate content of the original gastric mucosal scrapings. Gas-liquid chromatography of sugars showed the fraction to be enriched in mannose and *N*-acetyl glucosamine. The total carbohydrate content of the material was 5.5-7% by weight. Immunodiffusion against specific antisecretory component serum failed to demonstrate the presence of the secretory component in this fraction. It is concluded that gastric mucosal IgA, which appears to differ from a typical serum IgA in lacking the characteristic secretory component activity, can be separated from the carbohydrate-rich gastric mucoproteins by CsCl fractionation. This finding indicates the absence of covalent bonding between IgA and the mucoproteins of gastric mucus.

3555 PROSTAGLANDIN CYTOPROTECTION OF GASTRIC MUCOSA. (Eng.) Chaudhury, T. K.; Jacobson, E. D. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 74(1):58-63; 1978.

The possibility that prostaglandins protect the gastric mucosa by stimulation of the active transport of sodium was tested in dogs. Paired mucosal segments from the corpus of the stomach were mounted between bathing chambers to allow measurement of unidirectional fluxes of ^{22}Na, the electrical potential difference (PD) across the mucosa that is generated by the active transport of sodium, and the short-circuit current. The electrical resistance (R) was calculated from Ohm's law. The flux of ^{22}Na from serosa to mucosa ($J^{Na}_{s\to m}$)is an index of the passive transport of the ion and is a measure of membrane permeability. The difference between the two unidirectional fluxes (J^{Na}_{net}) represents the rate of active transport of the ion. If a topical damaging drug acted exclusively by increasing membrane permeability, one would anticipate the following responses to the agent: increased $J^{Na}_{s\to m}$, little effect on J^{Na}_{net}, decreased PD, and decreased R. Adding indomethacin (2.2×10^{-4} M) to the mucosal bathing solution caused no change in $J^{Na}_{s\to m}$, decreases in both J^{Na}_{net} and PD, and an increase in R. These findings suggest a primary effect on active transport of sodium. Effects of indomethacin on J^{Na}_{net}, PD, and R were reversed by 16,16 dimethyl prostaglandin E_2 (8×10^{-7} M) and by agents known to increase intracellular cyclic AMP content (theophylline and dibutyryl cyclic AMP). Incubation of mucosae with the prostaglandin increased measured cyclic AMP content 60% at a time before the full electrophysiological response. These data support the hypothesis that active transport of sodium is inhibited by a damaging agent and is stimulated by a protective agent, the latter appearing to act via increased accumulation of intracellular cyclic AMP.

3556 EFFECT OF 16,16-DIMETHYL PROSTAGLANDIN E_2 METHYL ESTER ON GASTRIC SECRETION INDUCED BY PENTAGASTRIN AND PEPTON [sic] MEAL IN MAN. (Eng.) Swierczek, J.; Kwiecien, N.; Oleksy, J.; Konturek, S. J. (Instytut Fizjologii, Grzegorzecka 16, 31-531 Krakow, Poland). *Acta Physiol. Pol.* 27(2):131-138; 1976.

The effect of 16,16-dimethyl prostaglandin E_2 methyl ester (PG/D, 1.25 μg/kg) on gastric secretion in 14 healthy male volunteers was studied to evaluate its usefulness in inhibiting gastric secretion and ulcer formation. Gastric secretion was stimulated by pentagastrin (i.v., 2 μg/kg/hr) or by a pepton meal (10% aqueous solution, continuous intragastric flow). The intragastric administration of PG/D resulted in 60% inhibition of gastric secretion in the first hour of the pentagastrin test; this inhibition diminished to 42% by the third hour; pepsin output was inhibited about 40% in the first hour. PG/D caused almost complete inhibition of gastric acid response to a pepton meal together with a marked decline of gastric pepsin concentration and serum gastrin concentration. PG/D caused a decline of total mucoprotein (TMP) output from 254 ± 52.59 to 164.4 ± 43.59 mg/hr from the first to the third hours, compared to a basal output of 82.4 ± 18.14 mg/hr and a control output of 80.9 ± 20.57 mg/hr, ($p<0.01$); the effect was due mainly to the fall in volume output since no significant changes in TMP concentration were found. No side-effects or changes in blood pressure, heart rate, body temperature, or results of laboratory tests were found during the secretory studies with PG/D or in succeeding 24 hr after PG/D administration. The possible usefulness of PG/D in the treatment of peptic ulcer disease is suggested.

3557 RENEWAL OF MOUSE GASTRIC MUCOUS CELLS FOLLOWING FAST NEUTRON IRRADIATION: AN ULTRASTRUCTURAL AND CARBOHYDRATE HISTOCHEMICAL STUDY. (Eng.) Wattel, W.; Geuze, J. J.; de Rooij, D. G.; Davids, J. A. G. (Medical Faculty, State Univ., Nicolaas Beetsstraat 22, Utrecht, Netherlands). *Cell Tissue Res.* 183(3):303-318; 1977.

Mouse gastric mucosa was studied ultrastructurally and histochemically after exposure to fast neutron irradiation, and the results were compared with those in the normal stomach. The number of cells per gastric gland was decreased after irradiation (1.0 MeV, 400 rads), and the glands were shorter. At day 9 following irradiation, several glands showed a dilated lumen lined by flattened cells. Between days 9 and 16, some of the glands disappeared. Parietal and chief cells disappeared from the remaining glands. At the same time, restoration of the mucosa started. At day 6, proliferative cells were scattered along the isthmus. As in controls, the isthmus contained a few undifferentiated cells, many differentiating surface mucous cells (SMC) with developing rough endoplasmic reticulum and silver proteinate-reactive Golgi element, and small secretory granules. At day 9, numerous proliferative cells were clustered in foci. Almost all these cells contained silver proteinate-reactive Golgi elements, granules, and vesicles. Most of them were SMC, others mucous neck cells (MNC) or intermediates. At day 16, proliferative foci were larger and consisted of differentiated mucous cells. Regenerated foveolae and glands consisted of large SMC and MNC and a few fibrillovesicular cells. In conclusion, proliferative activity is confined to undifferentiated cells and differentiating mucous cells, which identifies them as the progenitors of the other gastric cell types.

3558 STRESS ULCER--AN EXPERIMENTAL STUDY.

(Ger.) Kokoschka, R.; Gober, I.; Gebhart, W. (I. Chirurgische Universitatsklinik, Alser Strasse 4, A-1090 Vienna, Austria). *Wien. Klin. Wochenschr.* 89(16):553-562; 1977.

The effect of hypovolemic shock, induced by the withdrawal of blood from the femoral artery for 1-4 hr, on the perfusion of the stomach and the development of stress ulcer was studied in 14 mongrel dogs. Compared with an initial value of 66.73 ml/kg of body weight, the aortic blood flow was reduced to 46.79 ml/kg after 1-hr bleeding and to 36.37 ml/kg after 4 hr. The blood flow in the celiac artery was reduced from 6.56 ml/kg to 3.96 ml/kg after 4 hr, and the blood flow in the gastric artery, measured after bleeding for 4 hr, was 0.64 ml/kg versus an initial value of 1.62 ml/kg. The central venous pressure showed no significant change during the experiment, while the serum gastrin level dropped from 43.85 μg/ml to 33.66 μg/kg after 4 hr. Significant histological changes were seen in the gastric mucosa as a result of the hemodynamic changes, especially when the duration of the shock was 4 hr. All stages of stress ulcer from superficial erosion to deep ulcers were documented. Loss of the superficial epithelium and its replacement by necrobiotic zones and depletion and degranulation of mast cells were seen. The findings suggest that mast cells may play a mediator role in the pathogenesis of stress ulcer.

3559 CHANGES IN GASTRIC GLANDULAR CELL KINETICS AFTER SMALL BOWEL RESECTION IN THE RAT.

(Eng.) Seelig, L. L., Jr.; Winborn, W. B.; Weser, E. (Univ. Texas Health Science Center at Dallas, 5323 Harry Hines Blvd., Dallas, TX 75235). *Gastroenterology* 74(1):1-6, 1978.

The various types of gastric gland epithelial cells involved in the hyperplastic response to intestinal resection were studied in male Sprague-Dawley rats after a 50% resection involving the proximal small intestine. Two months after the operation, resected and control animals were given either a single or four successive i.p. injections of [^{3}H]thymidine (1 μCi/g). Animals from each group were killed 1 hr after the single injection and 3, 7, 30, and 60 days after the first multiple dose injection of [^{3}H]thymidine. At all periods after the multiple [^{3}H]thymidine doses, the percentages of labeled parietal and chief cells were significantly increased in animals with small bowel resection when compared with corresponding controls ($p<0.05$, $p<0.01$, $p<0.05$, and $p<0.001$ for parietal cells at each day, resp.; $p<0.01$, $p<0.05$, $p<0.001$, and $p<0.01$ for chief cells, resp.). The percentages of labeled mucous cells of the gastric glands were also increased in animals with small bowel resection at the 3- and 7-day periods. One hour after the single injection of [^{3}H]thymidine, the percentage of labeled gastric mucosal progenitor cells in animals with small bowel resection, although increased, was not significantly different from that in controls. It is, therefore, believed that the increases in percentage labeling of gastric glandular epithelial cells at 3, 7, 30, and 60 days could not solely be explained on the basis of an increased turnover rate of gastric progenitor cells. Rather, it might be concluded that the increase in glandular epithelial cells is accomplished, in part, by increased differentiation of gastric progenitor cells.

3560 FOLLOW-UP STUDY OF GASTRIN RESPONSE AFTER RESECTION OF THE JEJUNUM AND THE ILEUM.

(Eng.) Kajiwara, T.; Tamura, K.; Suzuki, T. (Kyoto Univ. Medical Sch., Shogoin, Sakyo-ku, Kyoto, 606, Japan). *Ann. Surg.* 186(6):694-699; 1977.

The effect of jejunal or ileal resection on gastrin release was studied in dogs. The i.v. infusion of L-arginine (0.5 g/kg for 30 min) was the most practical in evaluating gastrin release in addition to insulin and glucagon release. Serum gastrin levels in response to this dose of arginine were determined before, and 3 weeks, 3 months, and 1 yr after the resection of the jejunum or ileum. At 3 weeks, a significant increase in gastrin levels occurred in both the fasting state and after stimulation in dogs with either jejunum or ileum resection. At 3 months, the elevated gastrin response persisted only in those with jejunal resection. By 1 yr, the gastrin levels had fallen in almost all dogs to approximately the preoperative levels. These and other studies suggest that serum gastrin does not always play a main role in the hyperacidity in the later stage after massive intestinal resection.

3561 INCREASED MEAL-STIMULATED GASTRIC ACID SECRETION AND SERUM GASTRIN AFTER EXTENSIVE SMALL BOWEL RESECTION IN PUPPIES.

(Eng.) Wolf, S. A.; Telander, R. L.; Dozois, R. R.; Go, V. L. W. (Mayo Clinic, Rochester, MN 55901). *J. Pediatr. Surg.* 12(6):921-927; 1977.

The effects of massive resection of the small intestine (80% of the jejunum and ileum) on gastric acid secretion and serum gastrin level induced by feeding (ground boiled beef liver) were studied in six beagle puppies provided with vagally denervated pouches of the oxyntic gland area. Littermates were randomly assigned either as controls (nonresected) or as experimental (resected) animals. The mean basal acid output did not significantly differ within littermate pairs or between the entire control and resected groups (22 ± 8 and 20 ± 6 μEq/hr, resp.). However, the acid response during the 5th, 6th, 7th, and 8th hr after meal ingestion was significantly greater ($p<0.05$) in the resected group than in the control group. The cumulative acid output was 10.1 ± 1.8 mEq/8 hr in the resected group compared with 4.0 ± 1.4 mEq/8 hr in the control group ($p<0.05$). The mean fasting serum gastrin concentrations in control dogs (94 ± 10 pg/ml) did not significantly differ from those in resected dogs (64 ± 12 pg/ml). However, in littermate pairs, the mean serum gastrin concentrations at 6, 7, and 8 hr were significantly ($p<0.05$) greater in resected than in control puppies. Total integrated gastrin levels were significantly ($p<0.05$) less in littermate control puppies (22.3 ± 2.9 and 56.4 ± 15.7

ng/ml/8 hr) than in littermate resected puppies (61.3 ± 20.0 and 139.9 ± 19.6 ng/ml/8 hr). The integrated serum gastrin values during the 5th and 6th hr and during the 7th and 8th hr were significantly ($p<0.05$) greater after resection than before. The increase in gastric acid output correlated linearly with the acid and hypergastrinemia.

3562 EXPERIMENTAL GASTRIC SYMPATHECTOMY: AN EFFECTIVE PROPHYLAXIS OF GASTRIC STRESS LESIONS. (Eng.) Hottenrott, C.; Seufert, R. M.; Kuhne, F. W.; Busing, M. (Dept. Surgery, Univ. Heidelberg, Heidelberg, W. Germany). *Ann. Surg.* 186 (6):762-765; 1977.

The possible value of sympathectomy in the prevention of gastric stress ulceration was tested. Fifteen mini-pigs were bled to a mean aortic blood pressure of 40 mm Hg and maintained at that level for 3 hr. The control group consisted of eight animals with shock for 3 hr; the test group was comprised of seven animals with a similar shock period but they had undergone splanchnicectomy 14 days earlier. In all animals, a stimulated gastric secretion test was performed 3 days before and 8 days after splanchnicectomy. All controls showed severe gastric mucosal lesions after shock. Conversely, the piglets with splanchnicectomy developed no changes (5 animals) or only minor changes (2 animals). The efficacy of splanchnicectomy was confirmed by a stimulated gastric secretion test in which basal acid output did not change after operation (0.56 ± 0.35 mEq/1/30 min before and 0.20 ± 0.06 mEq/1/30 min after), but peak acid output increased significantly (from 2.99 ± 0.52 mEq/1/30 min to 5.35 ± 0.41 mEq/1/30 min, $p<0.0025$). This study suggests that gastric splanchnicectomy prevents gastric ulceration following experimental shock in pigs.

3563 ROLE OF THE SYMPATHETIC NERVOUS SYSTEM IN PEPTIC ULCER PRODUCTION IN RATS. (Eng.) Moraes, M. F.; Nyhus, L. M.; Kalahanis, N. G.; Bombeck, C. T.; Das Gupta, T. K. (Abraham Lincoln Sch. Medicine, P.O. Box 6998, Chicago, IL 60680). *Surgery* 83(2):194-199; 1978.

The role of the sympathetic nervous system in gastric acid secretion and in experimental cysteamine-induced (400 mg/kg, s.c.) duodenal ulceration was studied in male Sprague-Dawley rats. The animals were divided randomly into seven groups: (a) control, (b) sham-operated, (c) surgical sympathectomy, (d) chemical sympathectomy, (e) vagotomy, (f) surgical sympathectomy plus vagotomy, and (g) chemical sympathectomy plus vagotomy. Results on gastric acid secretion were expressed as gastric acid output (GAO=µEq of acid secretion in 1 hr). The means in the control and sham groups were 447.83 ± 26.67 GAO and 399 ± 36.4 GAO, resp. The means in the sympathectomized rats (surgically=562 ± 27.21 GAO and chemically=648.66 ± 46.53 GAO) were higher ($p<0.01$) than those of the control and sham groups. In the vagotomized group the mean was 156.6 ± 17.64 GAO, lower than those of the control and sham groups ($p<0.001$). The incidence of ulceration was 47.5% and 46% in the control and sham groups, resp. Both the sympathectomized groups (surgically, 73%; chemically, 77%), had a significantly elevated incidence of ulceration as compared with the controls ($p<0.01$). The vagotomized group had a 14% incidence of ulceration. These results indicate that sympathectomy affects both gastric acid secretion and the incidence of experimental peptic ulceration in rats.

3564 SURGICAL VAGOTOMY AND STOMACH WALL ATP AND ADP IN PYLORUS-LIGATED RATS. (Eng.) Mozsik, G.; Vizi, F. (Univ. Medical Sch., H-7643 Pecs, Hungary). *Am. J. Dig. Dis.* 22(12):1072-1075; 1977.

The stomach wall ATP and ADP levels were studied 24 hr after pylorus ligation in Wistar rats with and without bilateral surgical vagotomy. The amounts and concentrations of ATP and ADP significantly decreased in the corpus plus antrum and in the forestomach in pylorus-ligated rats ($p<0.001$), while the amounts and concentrations remained at a significantly higher level ($p<0.001$) in pylorus-ligated plus vagotomized rats. It is concluded that the breakdown of ATP is necessary to produce gastric hypersecretion and ulceration in pylorus-ligated rats. This decrease of cellular ATP can be prevented by bilateral surgical vagotomy.

3565 BODY WEIGHT AND GASTRIC ACID SECRETION IN RATS WITH SUBDIAPHRAGMATIC VAGOTOMY AND LATERAL HYPOTHALAMIC LESIONS. (Eng.) Opsahl, C. A.; Powley, T. L. (Yale Univ. Sch. Medicine, New Haven, CT 06508). *J. Comp. Physiol. Psychol.* 91(6): 1284-1296; 1977.

To investigate the role of the vagus in the lateral hypothalamic (LH) syndrome of body weight loss, male albino rats were divided into four groups: (a) animals with bilateral LH lesions that were subsequently given a bilateral subdiaphragmatic vagotomy, (b) LH animals that received a control vagotomy operation, (c) animals without lesions that underwent a subdiaphragmatic vagotomy, and (d) animals without lesions that underwent a control vagotomy operation. Both LH lesions and vagotomy reduced body weight levels, although the effects differed in terms of the length of time required to reach initial maximal loss, the time required to reach chronic levels of maintenance, and the severity of body weight reduction. Fasting gastric acid secretion was lowered by LH lesions ($p<0.05$), and the extent of this reduction was positively correlated with the reduction in body weight ($r=0.69$, $p<0.005$). Gastric contents after a 24-hr fast were greater in vagotomized rats than in nonvagotomized animals. The fact that the weight lowering effect of vagotomy was found to be much weaker in animals in which the lateral hypothalamus was intact than in the LH rats suggests that an intact lateral hypothalamus actively mitigates the effects of vagotomy. Alternatively, the exaggerated weight loss observed as a result of the combined LH-lesion-vagotomy procedure might be evidence that intact vagal innervation is actually involved in minimizing the effects on body weight of LH lesions.

3566 COMPARISON OF AMINO ACIDS BATHING THE PYLORIC GLAND AREA IN THE STIMULATION OF GASTRIC ACID SECRETION [Abstract]. (Eng.) Konturek, S. J.; Tasler, J.; Cieszkowski, M.; Wunsch, E. (Inst. Physiology, Medical Acad., Krakow, Poland). *Gastroenterology* 72(5, Part 2):1083; 1977.

3567 SOME PROPERTIES SHARED BY AMINO ACIDS AND ENTERO-OXYNTIN [Abstract]. (Eng.) Landor, J. H.; Beloni, A.; Mariano, E. C. (CMDNJ-Rutgers Medical Sch., Piscataway, NJ). *Gastroenterology* 72(5, Part 2):1085; 1977.

3568 THE EFFECT OF INDIVIDUAL AMINO ACIDS (AA) ON GASTRIC EMPTYING TIME (GET) IN MAN [Abstract]. (Eng.) Byrne, W. J.; Walsh, J. H.; Ament, M. E. (Dept. Pediatrics, Univ. California, Los Angeles, CA 90024). *Gastroenterology* 72(5, Part 2):1035; 1977.

3569 EFFECT OF ACUTE ACETYLSALICYLIC ACID AND INDOMETHACIN ADMINISTRATION ON GASTRIC CELL LOSS IN MAN [Abstract]. (Eng.) Corinaldesi, R.; Casadio, R.; Fabbri, R.; Luchetta, L.; Ricci, P.; Barbara, L. (Cattedra di Gastroenterologia, Policlinico S. Orsola, Bologna, Italy). *Rend. Gastroenterol.* 9(1):80-81; 1977.

3570 PARENTERAL ASPIRIN AND THE GASTRIC MUCOSAL BARRIER [Abstract]. (Eng.) Guth, P. H.; Paulsen, G. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1066; 1977.

3571 ASPIRIN- AND BILE-INDUCED ACUTE EROSIVE GASTRITIS. ITS PREVENTION BY METIAMIDE THERAPY. (Eng.) Mann, N. S.; Sachdev, A. J. (Veterans Admin. Hosp., Louisville, KY). *Arch. Pathol. Lab. Med.* 101(4):206-207; 1977.

3572 PROTECTION AGAINST ASPIRIN-INDUCED GASTRIC MUCOSAL INJURY BY 16,16 DIMETHYL PROSTAGLANDIN E_2 [Abstract]. (Eng.) Miller, T. A.; Tepperman, B. L. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2):1102; 1977.

3573 EFFECT OF SOME ANTI-INFLAMMATORY DRUGS ON THE GASTRIC MUCOSAL BARRIER IN THE RAT [Abstract]. (Eng.) Baldi, F.; Salvati, P.; Righi, M.; Biasco, G.; Salera, M.; Miglioli, M.; Barbara, L. (Cattedra di Gastroenterologia dell' Universita, Bologna, Italy). *Rend. Gastroenterol.* 9(1):79; 1977.

3574 ATROPINE INCREASES THE GASTRIN RESPONSE AND SUPPRESSES THE GASTRIC INHIBITORY (GIP) RESPONSE TO A MEAL IN DOGS [Abstract]. (Eng.) Baumert, J.; Mazzaferri, E.; Tetirick, C.; Pace, W.; Cataland, S. (Dept. Medicine, Ohio State Univ., Columbus, OH). *Gastroenterology* 72(5, Part 2):1028; 1977.

3575 COMPARATIVE EFFECTS OF L-DOPA, PROPEXYPHRENE, ACETOAMINOPHEN, INDOMETHACIN AND PHENYLBUTAZONE ON GASTRIC MUCOSA [Abstract]. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1095; 1977.

3576 GASTRIC EFFECTS OF PROPEXYPHENE, ACETOAMINOPHEN, INDOMETHACIN, PHENYLBUTAZONE AND TOLECTIN [Abstract]. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1095; 1977.

3577 BILE EXPOSURE INCREASES RESISTANCE OF GASTRIC MUCOSAL BARRIER TO RUPTURE [Abstract]. (Eng.) Scheurer, U.; Schlegel, J.; Kelly, D.; Code, C. F. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1127; 1977.

3578 IN VIVO EFFECTS OF BILE SALTS ON ACID SECRETION BY THE RAT STOMACH [Abstract]. (Eng.) Elmasri, S. H.; Lewin, M. R.; Clark, C. G. (Univ. Coll. Hosp., Medical Sch., London, England). *Gut* 18(5):A405-A406; 1977.

3579 EFFECT OF BILE SAMPLES OF DIFFERENT BILE SALT COMPOSITION OF THE GASTRIC MUCOSAL BARRIER IN THE RAT [Abstract]. (Eng.) Baldi, F.; Salvati, P.; Salera, M.; Biasco, G.; Miglioli, M.; Barbara, L. (Cattedra di Gastroenterologia dell' Universita, Bologna, Italy). *Rend. Gastroenterol.* 9(1):51; 1977.

3580 CALCIUM STIMULATION OF GASTRIN AND GASTRIC ACID SECRETION: EFFECT OF SMALL DOSES OF CALCIUM CARBONATE [Abstract]. (Eng.) Behar, J.; Smyth, R. D. (Dept. Medicine, Brown Univ., Providence, RI). *Rend. Gastroenterol.* 9(11):59-60; 1977.

3581 CAPASAICIN INDUCED ACUTE EROSIVE GASTRITIS: ITS PREVENTION BY MYLANTA II, METIAMIDE AND CIMETIDINE [Abstract]. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1096; 1977.

3582 INTERACTION BETWEEN ACUTE GASTRIC ULCER AND EPINEPHRINE-INDUCED EROSIONS IN THE RAT. (Eng.) Raugstad, T. S.; Svanes, K.; Molster, A. (Dept. General Surgery, Haukeland Sykehus, N-5000 Bergen, Norway). *Eur. Surg. Res.* 9(1):67-73; 1977.

3583 THE CONTROL OF GASTRIC ACID SECRETION USING HISTAMINE H_2-RECEPTOR ANTAGONISTS [Abstract]. (Eng.) Barbezat, G. O.; Bank, S. (Groote Schuur Hosp., Cape Town, South Africa). *Rend. Gastroenterol.* 9(1):71; 1977.

3584 GASTRIN INDEPENDENT INDUCTION OF GASTRIC SECRETORY CAPACITY BY PROLONGED HISTAMINE-H2 BLOCKER TREATMENT [Abstract]. (Eng.) Hacki, W. H.; Hacki, S. K.; Witzel, L.; Halter, F. (Inselspital, Univ. Berne, Berne, Switzerland). *Acta Endocrinol. (Kbh.)* 85(Suppl. 212):195; 1977.

3585 VASODILATOR AND SECRETORY RESPONSES TO HISTAMINE H_1 AND H_2-RECEPTORS [Abstract]. (Eng.) Tepperman, B. L.; Tague, L. L.; Miller, T. A.; Pawlik, W.; Jacobson, E. D. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2):1140; 1977.

3586 EFFECT OF GROWTH HORMONE ON SERUM, ANTRAL AND DUODENAL GASTRIN IN HYPOPHYSECTOMIZED RATS [Abstract]. (Eng.) Teichmann, R. K.; Hill, F. C.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX). *Gastroenterology* 72(5, Part 2):1139; 1977.

3587 GASTRIC MUCOSAL GROWTH AFTER PROLONGED METIAMIDE TREATMENT: A SECRETORY AND MORPHOMETRIC STUDY IN THE RAT [Abstract]. (Eng.) Witzel, L.; Halter, F.; Olah, A.; Hacki, W. (Inselspital, Bern, Switzerland). *Rend. Gastroenterol.* 9(1):80; 1977.

3588 THE EFFECT OF METIAMIDE ON THE GASTRIC MUCOSAL BARRIER. (Eng.) Drew, R.; Freeman, T.; Fischer, R. P. (Saint Paul-Ramsey Hosp., 640 Jackson, Saint Paul, MN 55101). *J. Surg. Res.* 22(5):534-537; 1977.

3589 DIFFERENT EFFECTS OF VASOPRESSIN AND MECHANICAL ISCHEMIA ON OXYGENATION AND ELECTRICAL POTENTIAL IN THE GASTRIC MUCOSA [Abstract]. (Eng.) Bowen, J. C.; Salvato, P. D.; Garg, D. K.; Jacobson, E. D. (Ochsner Medical Inst., New Orleans, LA). *Gastroenterology* 72(5, Part 2):1031; 1977.

3590 EFFECT OF GASTRIC INTUBATION ON THE GASTRIC LOSS OF SERUM ALBUMIN [Abstract]. (Eng.) Brassinne, A. (Hopital de Baviere, Liege, Belgium). *Rend. Gastroenterol.* 9(1):75-76; 1977.

3591 CORRELATION BETWEEN GASTRIC PROTEIN KINASE AND SECRETION IN THE PYLORUS LIGATED RAT. (Eng.) Capobianco, J. O.; Mollison, K. W.; Lee, Y. H.; Lee, S. G.; Hung, P. P. (Dept. Pharmacology, Abbott Lab., North Chicago, IL 60064). *Biochem. Pharmacol.* 26(10):991-994; 1977.

3592 ACUTE EFFECTS OF TRUNCAL VAGOTOMY ON GASTRIC WALL TISSUE GASES IN THE DOG. (Eng.) Inberg, M. V.; Havia, T.; Niinikoski, J. (Dept. Surgery, Univ. Turku, Turku, Finland). *Acta Chir. Scand.* 143(1):57-62; 1977.

3593 PREVENTION OF STRESS ULCERATIONS WITH CIMETIDINE AND CARBENOXOLONE. (Eng.) Strauss, R. J.; Stein, T.; Mandell, C.; Wise, L. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY). *Surg. Forum* 28:361-363; 1977.

3594 CIMETIDINE PREVENTS STRESS-INDUCED GASTRIC EROSIONS. (Eng.) Levine, B. A.; Teegarden, D. K.; McLeod, C. G., Jr.; Sirinek, K. R.; Pruitt, B. A., Jr. (Brooke Army Medical Center, Fort Sam Houston, TX). *Surg. Forum* 28:359-361; 1977.

3595 PROTECTION OF GASTRIC MUCOSA AGAINST ASPIRIN-INDUCED EROSIONS BY ENHANCED BLOOD FLOW. (Eng.) McGreevy, J. M.; Moody, F. G. (Univ. Utah Coll. Medicine, Salt Lake City, UT). *Surg. Forum* 28:357-359; 1977.

3596 METHYLPREDNISOLONE PROTECTS AGAINST BILE-ACID-INDUCED ACUTE GASTRIC MUCOSAL ULCEROGENESIS. (Eng.) Cherry, K. J., Jr.; Ritchie, W. P., Jr. (Univ. Virginia Medical Center, Charlottesville, VA). *Surg. Forum* 28:355-357; 1977.

3597 EFFECT OF PARIETAL CELL VAGOTOMY AND SUBSEQUENT UNILATERAL TRUNCAL VAGOTOMY ON CANINE GASTRIC ACID SECRETION AND EMPTYING. (Eng.) Hardy, B. M.; Safaie-Shirazi, S.; Ehrhardt, J. C.; Chaudhuri, T. K. (Univ. Iowa Coll. Medicine, Iowa City, IA). *Surg. Forum* 28:353-355; 1977.

See also, 3473, 3497, 3501, 3503, 3522, 3542, 3766, 3773, 3774, 3826, 3834, 3869, 3881, 3936, 3948, 3964, 3967, 3978, 3986, 4266.

SECRETION AND METABOLISM

Pancreas

3598 DEVELOPMENT OF THE EMBRYONIC MAMMALIAN PANCREAS: THE RELATIONSHIP BETWEEN MORPHOGENESIS AND CYTODIFFERENTIATION. (Eng.) Spooner, B. S.; Cohen, H. I.; Faubion, J. (Div. Biology, Kansas State Univ., Manhattan, KS 66506). *Dev. Biol.* 61(2):119-130; 1977.

The degree to which cytodifferentiation is obligatorily coupled to ongoing morphogenesis was analyzed in the developing mouse pancreas system. Protodifferentiated pancreatic epithelia were isolated from investing mesoderm and cultured on plastic substrata. Within 24 hr, the epithelia spread into two-dimensional monolayers. Under these conditions, acinar formation failed to take place. The cells did not undergo mitosis, a finding consistent with the absence of mesenchymal cells or mesenchymal factor from these cultures. In spite of the absence of morphogenesis, cytodifferentiation took place on schedule. Thus, over 5-7 days of culture, amylase specific activity rose 100-fold, and zymogen granules appeared in the cells. The results indicate that the regulation of exocrine cytodifferentiation is independent of ongoing morphogenesis.

3599 INTRACELLULAR DIVALENT CATION RELEASE IN PANCREATIC ACINAR CELLS DURING STIMULUS-SECRETION COUPLING. I. USE OF CHLOROTETRACYCLINE AS FLUORESCENT PROBE. (Eng.) Chandler, D. E.; Williams, J. A. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *J. Cell Biol.* 76(2): 371-385; 1978.

Stimulus-secretion coupling in pancreatic exocrine cells was studied using dissociated acini, prepared from mouse pancreas, and chlorotetracycline (CTC), a fluorescent probe that forms highly fluorescent complexes with Ca^{2+} and Mg^{2+} ions bound to membranes. Acini, preloaded by incubation with CTC (100 μM), displayed a fluorescence having spectral properties like that of CTC complexed to calcium (excitation and emission maxima at 398 and 527 nm, resp.). Stimulation with either bethanechol (100 μM) or cerulein (10 ng/ml) resulted in a rapid loss of fluorescence intensity and an increase in outflux of CTC from the acini. After 5 min of stimulation, acini fluorescence was reduced by 40% and appeared to be that of CTC complexed to Mg^{2+} (excitation and emission maxima at 393 and 521 nm, resp.). The fluorescence loss induced by bethanechol was blocked by atropine (5 μM) and was seen at all agonist concentrations that elicited amylase release. Maximal fluorescence loss, however, required a bethanechol concentration three times greater than that needed for maximal amylase release. In contrast, acini preloaded with 1-anilino-8-naphthalenesulfonate or oxytetracycline displayed no secretagogue-induced fluorescence changes. These results support the hypothesis that CTC is able to probe some set of intracellular membranes that release calcium during secretory stimulation and that this release results in dissociation of Ca^{2+}-complexed CTC.

3600 MORPHOLOGICAL CHANGES IN RAT PANCREATIC SLICES ASSOCIATED WITH INHIBITION OF ENZYME SECRETION BY HIGH CONCENTRATIONS OF SECRETAGOGUES. (Eng.) Savion, N.; Selinger, Z. (Hebrew Univ. Jerusalem, Jerusalem, Israel). *J. Cell Biol.* 76(2):467-482; 1978.

The morphological and biochemical characteristics of the inhibition of enzyme secretion seen with high concentrations of secretagogues were examined. Stimulation of enzyme secretion in rat pancreatic slices by cholinergic agonists or by cholecystokinin-pancreozymin (CCK-PZ) and its peptide analogs showed a biphasic dose response curve. The optimal concentrations eliciting an efficient rate of enzyme secretion were 1 μM for carbamylcholine or acetylcholine, and 5 nM and 20 nM for CCK-PZ octapeptide and CCK-PZ, resp. At higher concentrations of secretagogues, however, the rate of secretion progressively declined, and almost complete inhibition was achieved at 1 mM of carbamylcholine or acetylcholine and at 0.1 μM of CCK-PZ or its octapeptide analog. Atropine displaced the dose-response curve for carbamylcholine to the right so that in the presence of 7 μM atropine a concentration of 1 mM carbamylcholine gave an optimal rate of enzyme secretion. The ionophore A-23187 did not relieve the inhibition caused by supraoptimal concentrations of secretagogues, indicating that the inhibition occurs at the cellular rather than at the receptor level. Secretin had no effect on the inhibition of enzyme secretion by a high concentration of carbamylcholine, indicating that the inhibition was not caused by lack of water and electrolyte secretion. The energy-producing metabolism was not affected, since the ATP level in the pancreatic slices was the same in the presence of either inhibitory or optimal concentrations of secretagogues. The inhibition of enzyme secretion was reversible because restoration of efficient enzyme secretion occurred after removal of carbamylcholine (1 mM) by washing, followed by addition of an optimal concentration of CCK-PZ octapeptide. Morphological studies revealed that the presence of inhibitory concentrations of secretagogues caused severe distortion of the lumen structure: disruption of the filamentous system surrounding the lumen, disappearance of microvilli, and production of distended evaginations of the luminal membrane containing cellular material. These changes eventually caused a reduction in the size of the lumen, which became plugged with secretory material. These changes in the microtubular microfilamentous system could account for the inhibition of enzyme secretion.

3601 ON THE SECRETAGOGUE EFFECT OF DIBUTYRYL CYCLIC AMP IN THE RAT EXOCRINE PANCREAS. (Eng.) Bauduin, H.; Stock, C.; Launay, J. F.; Vincent, D.; Potvliege, P.; Grenier, J. F. (Free Univ. Brussels, Lab. Biochemical Pharmacology, B-1000 Brussels, Belgium). *Pfluegers Arch.* 372(1): 69-76; 1977.

Since the implication of cyclic AMP in the action of physiological stimuli is questionable and cyclic AMP and dibutyryl cyclic AMP (DbcAMP) are known to have dissociated effects in various tissues or cell types, the secretagogue property of the nucleotide derivative on the exocrine pancreas was investigated more thoroughly in rats. DbcAMP at a concentration of 0.1 mM or greater induced the discharge of exportable enzymes from rat pancreas fragments incubated *in vitro*. This effect was seen to be qualitatively similar to the action of physiological secretagogues acting via hormone receptors in the following ways. It was accompanied by the appearance of exocytotic images at the acinar cell apex. It was energy dependent, but the energy supply was low, while that required for the carbamylcholine or cerulein response was high and could only be afforded by oxidative phosphorylation. It was calcium dependent, but no alteration of inward or outward calcium movement was observed. Lastly, it was altered by agents (e.g., cytochalasin B) previously shown to disrupt the microfilamentous microtubular system. However, the secretory response to DbcAMP was quantitatively less than that obtained with hormonal stimuli. A damaging effect of DbcAMP on pancreatic acinar cells was ruled out on histological and biochemical grounds: there was no significant leakage of LDH, and protein synthesis, and 2-deoxy-D-glucose and L-leucine uptake were unaltered. The secretagogue effect of DbcAMP was reversible, dose-related, and specific. It was not mediated by neurotransmitter release or by interaction with their receptors. The evidence points to a direct interaction of DbcAMP with the pancreatic acinar cell and suggests the last step of the secretory cycle as the most probable site of action of the nucleotide derivative.

3602 PANCREATIC EXOCRINE SECRETION IN ANESTHETIZED AND CONSCIOUS RATS. (Eng.) Petersen, H.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Am. J. Physiol.* 233(6):E530-E536; 1977.

Pancreatic secretion in response to graded doses of secretin and cholecystokinin was studied in conscious and anesthetized Sprague-Dawley rats. During the first 2 to 5 days after the pancreatic fistula was prepared, basal pancreatic volume and protein outputs increased markedly in the conscious rats, reaching levels more than 10 times greater than in anesthetized rats. Maximal bicarbonate output in response to secretin was more than four times greater in conscious than in anesthetized rats, but the maximal protein response to cholecystokinin was similar in the two states. In conscious rats, recirculation of bile plus pancreatic juice into the duodenum caused a significant decrease in bicarbonate and protein outputs (43% and 59% lower, resp.). Without recirculation, basal protein output was as high as the maximal response to cholecystokinin with recirculation and was not increased by exogenous cholecystokinin. The findings support the hypothesis that, unlike anesthetized rats, conscious rats have a high basal rate of spontaneous release of cholecystokinin and that this can be partially suppressed by recirculation of bile plus pancreatic juice. The responses of rats to secretin and cholecystokinin are greatly affected by the time that has elapsed since surgical preparation and by whether bile and pancreatic juice are recirculated into the gut.

3603 EFFECTS OF CHRONIC ALCOHOL ADMINISTRATION ON THE EXOCRINE PANCREATIC SECRETION OF THE CONSCIOUS RAT: A FOLLOW-UP STUDY. (Fre.) Laugier, R.; Sarles, H. (Unite de Recherches de Pathologie Digestive, INSERM U-31, 46, chemin de la Gaye, F 13009 Marseille, France). *Gastroenterol. Clin. Biol.* 1(10):767-774; 1977.

The effect of long-term alcohol consumption on basal exocrine pancreatic secretion and on secretion stimulated by the intraduodenal instillation of oleic acid was studied in adult male Sprague-Dawley rats. The animals received water *ad libitum* in which the alcohol content was increased from 5 to 20% over a 3-week period and maintained at 20% during the rest of the experiment (4, 8, or 12 months total length). Control rats received normal drinking water. Water and bicarbonate secretions were decreased at the 4th month of chronic alcohol consumption, but then returned to normal. However, protein secretion (both concentration and output) was increased at the beginning of the 4th month. In the 8th month, the basal protein output in the treated rats was more than twice as high as in the controls, and it could no longer be stimulated by intraduodenally administered oleic acid. The protein secretion seemed to have spontaneously reached its maximum. During the 12th month, the basal protein secretion in the treated rats was significantly lower than in the controls, and it was still not stimulated by oleic acid. This phenomenon could be explained by the progression of chronic pancreatic lesions that reduce the maximum secretory capacity of a hyperfunctioning pancreas. The findings indicate that chronic alcoholism at first reduces the basal and stimulated bicarbonate secretion, which phenomenon is then followed by changes in enzyme secretion. The increased protein secretion is the steadiest sign, before the onset of pancreatic insufficiency, of the effect of chronic alcoholism on the pancreas.

3604 THE EFFECT OF CHRONIC ETHANOL INGESTION ON THE PANCREATIC PROTEOLYTIC ENZYMES AND THEIR INHIBITORS IN THE RAT. (Eng.) Jalovaara, P.; Huttunen, R. (Dept. Anatomy, Univ. Oulu, 90220 Oulu 22, Finland). *Scand. J. Gastroenterol.* 12(7): 786-792; 1977.

The effect of chronic ethanol ingestion on pancreatic proteinases and their inhibitors, as well as some routinely assessed indices of pancreatic activity, were studied in 19 young inbred Long Evans male rats and 16 control animals. Ethanol (20% weight/volume, 1.1 ml/100 g of body weight) was administered by gastric intubation 5 times/week for 10-12 weeks. The general condition of animals, body weight gain, and the serum levels of hepatic transaminases did not change; the serum cholesterol level and the amount of trypsinogen, chymotrypsinogen, and specific and total casein hydrolizing activities in pancreatic homogenates did not differ significantly between the experimental and control groups. The activities of plasma enzymes commonly used as indicators of hepatic cell injury showed no difference between the control and experimental groups. Levels of blood amylase and serum triglycerides, the amount of soluble proteins in the homogenates, the specific and total BAPNA (*N*-alphabenzoyl-DL-arginine-4-nitroanilide-hydrochloride) hydrolyzing activities, and the total ATEE (*N*-acetyl-L-tyrosine ethyl ether) hydrolyzing activity were lower in the rats subjected to alcohol administration than in controls ($p<0.05$, $p<0.001$, $p<0.001$, $p\leq0.01$, $p\leq0.001$, and $p\leq0.01$, resp.). The trypsin inhibition of the homogenates was more pronounced and the plasma protein content was higher ($p<0.05$) in ethanol-treated rats, but the trypsin-inhibiting and trypsin-protecting capacities of the plasma were lower in the experimental group than in controls ($p\leq0.01$ and $p\leq0.001$). The results suggest that chronic ethanol ingestion in rats impairs protein synthesis in the pancreas leading to atrophy that corresponds to the clinical picture of chronic pancreatitis. Simultaneously, the protection mechanism of the blood against proteolytic enzymes is also impaired.

3605 INFLUENCE OF GLUCAGON ON EXOCRINE PANCREATIC FUNCTION AS DETERMINED BY THE LUNDH TEST IN DOGS. (Eng.) Gyr, K.; Kayasseh, L.; Stalder, G. A.; Rittmann, W. W.; Girard, J. (Kantonsspital, CH-4004 Basel, Switzerland). *Am. J. Vet. Res.* 38(12):1949-1952; 1977.

To standardize the Lundh test in dogs and to assess the extent to which the results are modified by glucagon administration, exocrine pancreatic function was investigated by the Lundh test in dogs with chronic duodenal and gastric fistulas. The mean tryptic activity detected in 18 tests in six dogs was 32.25 ± 5.25 μEqH+/min/ml, which is considerably higher than that observed in man. The administration of glucagon (5 or 10 μg/kg, i.v.) was followed at 30-60 min by a significant decrease (30.8%, $p<0.05$) in the volume of the duodenal contents and a more pronounced depression of the enzyme concentrations (trypsin 59%, chymotrypsin 53.3%, $p<0.02$). It is concluded that the Lundh test affords a valuable experimental model for the investigation of exocrine pancreatic function in dogs.

3606 METHADONE BLOCKADE OF 2-DEOXYGLUCOSE-INDUCED PANCREATIC SECRETION IN THE RAT: EVIDENCE FOR A CENTRAL SITE OF ACTION. (Eng.) Roze, C.; Chariot, J.; de La Tour, J.; Souchard, M.; Vaille, C.; Debray, C. (Hopital Bichat, 170 Blvd. Ney, 75877 Paris Cedex 18, France). *Gastroenterology* 74(2, Part 1):215-220; 1978.

The effects of methadone on pancreatic exocrine secretions were tested in male Wistar rats under basal conditions and following hormonal stimulation by secretin (0.125 U/kg/min) and cerulein (110 and 330 ng/kg) or after stimulation by the differentially acting cholinergic agents acetylcholine, 2-deoxyglucose, and electrical stimulation of the vagus. Methadone (2.5 or 5 mg/kg, s.c.) had no effect on basal hydroelectrolytic secretion. It decreased basal enzyme secretion very slightly. The stimulatory effects of 2-deoxyglucose (75 mg/kg, i.v.) were completely blocked by methadone at 5 mg/kg, and this blockade was reversed by nalorphine at 6 to 9 mg/kg. At 100 μg, methadone blocked 2-deoxyglucose effects when injected into brain ventricles, but the same dose was ineffective when systemically introduced. The effects of secretin, cerulein, acetylcholine, and electrical stimulation of the vagus were not depressed by methadone. These results strongly suggest that the methadone blockade of 2-deoxyglucose effects occurs at a central level and is mediated by narcotic drug receptors.

3607 EFFECT OF A SYNTHETIC ANALOGUE OF PGE_2 ON EXOCRINE AND ENDOCRINE PANCREATIC FUNCTION IN THE RAT. (Eng.) Dodi, G.; Santoro, M. G.; Jaffe, B. M. (Washington Univ. Sch. Medicine, St. Louis, MO 63110). *Surgery* 83(2):206-213; 1978.

The effect of 16,16-dimethyl prostaglandin E_2-methylester (di-M-PGE_2) on exocrine and endocrine pancreatic secretion was studied in male Lewis rats with chronic pancreatic fistulas. Under basal conditions as well as after stimulation with secretin and cholecystokinin octapeptide (OP-CCK), pancreatic exocrine secretion was markedly inhibited by the i.v. injection of di-M-PGE_2 at 10 μg/kg and 100 μg/kg. Secretory volumes and bicarbonate and protein outputs decreased within 10 min after the administration of di-M-PGE_2, and this inhibitory effect persisted throughout the following 40 min. The smaller dose of di-M-PGE_2 (10 μg/kg, PG-10) inhibited the volume of pancreatic secretion by an average of 47.7% and decreased bicarbonate and protein output by 41.1% and 70.5%, resp. The larger dose (100 μg/kg, PG-100) caused a mean 48.3% inhibition of pancreatic secretory volume and decreased bicarbonate and protein outputs by 41.7% and 64.5%, resp. Plasma insulin levels were lowered markedly after injection of di-M-PGE_2 under basal conditions (mean inhibition 63.1% by PG-10 and 55.3% by PG-100) as well as after secretin stimulation (mean inhibition 89.5% by PG-10 and 82.4% by PG-100). These observations document that di-M-PGE_2 is a potent inhibitor of pancreatic exocrine and endocrine function in unanesthetized rats. The PGE_2-analogue antagonized the stimulatory effects of both secretin and OP-CCK.

3608 EFFECT OF PANCREATIC DUCT LIGATION ON EXOCRINE PANCREATIC FUNCTION AND STRUCTURE IN THE RABBIT. (Eng.) Arvanitakis, C.; Folscroft, J. (Kansas Univ. Sch. Medicine, Kansas City, KS 66103). *Experientia* 15(1):77-79; 1978.

The effect of pancreatic duct ligation, which is used as an experimental model of pancreatic insufficiency, on exocrine pancreatic function and structure was studied in the rabbit. Four weeks after pancreatic duct ligation, fecal and luminal chymotrypsin were detected in concentrations similar to those in sham-operated controls. Pancreatic changes in the ligated group included marked dilatation of the main pancreatic duct, proliferation and distention of ductules, and fibrosis. Despite pancreatic duct ligation and fibrosis, proteolytic enzymes continued to secrete into the duodenal lumen. These results suggest that pancreatic duct ligation in the rabbit is not associated with total pancreatic insufficiency.

3609 THE EFFECT OF INTRAVENOUS ACETALDEHYDE ON EXOCRINE PANCREATIC FUNCTION [Abstract]. (Eng.) Andersen, B. N.; Demol, P.; Sarles, H. (INSERM 46, chemin de la Gaye, 13009 Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1):4-5; 1977.

3610 IN VITRO STIMULATION OF L-LEUCINE-4,5-^{3}H INCORPORATION AND ENZYME SECRETION OF THE RAT PANCREAS BY CLANOBUTINE [Abstract]. (Eng.) Hotz, J.; Fahlbusch, V.; Goebell, H. (Medical Clinic, Univ. Essen, Essen, W. Germany). *Ir. J. Med. Sci.* 146(Suppl. 1):4; 1977.

3611 ETHANOL: METABOLISM AND ACTION ON PROTEIN SYNTHESIS AND SECRETION IN THE RAT PANCREAS [Abstract]. (Eng.) Clemente, F.; Estival, A.; Ribet, A. (INSERM U 151, C.H.U. Rangueil, 31052 Toulouse, France). *Ir. J. Med. Sci.* 146(Suppl. 1): 4; 1977.

3612 INVOLVEMENT OF TWO ENZYMATIC POOLS OF DIFFERENT COMPOSITION AND SIZE IN RAT PANCREATIC SECRETION [Abstract]. (Eng.) Dagorn, J. C.; Michel, R.; Figarella, C.; Sarles, H. (Unite 31 INSERM, 46 chemin de la Gaye, 13009 Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1): 3-4; 1977.

3613 INTERACTION BETWEEN SECRETIN AND DOPAMINE ON CYCLIC AMP TISSUE LEVELS IN THE RAT PANCREAS [Abstract]. (Eng.) Vaysse, N.; Esteve, J. P.; Brenac, B.; Moatti, J. P.; Pascal, J. P. (INSERM U 151, C.H.U. Rangueil, 31052 Toulouse, France). *Ir. J. Med. Sci.* 146(Suppl. 1):7; 1977.

3614 THE EXOCRINE PANCREATIC SECRETION AND IMMUNOREACTIVE SECRETIN (IRS) RELEASE AFTER INTRADUODENAL INSTILLATION OF BILE IN MAN [Abstract]. (Eng.) Osnes, M.; Hanssen, L. E.; Flaten, O.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Ir. J. Med. Sci.* 146(Suppl. 1):8; 1977.

3615 SOMATOSTATIN (SRIF) INHIBITS PANCREATIC ENZYME SECRETION AND GALLBLADDER EMPTYING CAUSED BY INTRALUMINAL DIGESTIVE PRODUCTS AND EXOGENOUS CHOLECYSTOKININ (CCK) IN MAN [Abstract]. (Eng.) Holtermuller, K. H.; Schittelkop, G.; Schulmerich, H. (Medizinische Klinik, Langenbeckstr. 1, 65 Mainz, W. Germany). *Ir. J. Med. Sci.* 146 (Suppl. 1):14; 1977.

3616 UPTAKE AND EXCHANGE OF $^{15}Ca^{2+}$ WITH ISOLATED PANCREATIC ACINI [Abstract]. (Eng.) Poulsen, J. H.; Williams, J. A. (Dept. Physiology, Univ. California, San Francisco, CA). *Ir. J. Med. Sci.* 146(Suppl. 1):5; 1977.

3617 EFFECT OF PGE$_2$ ON THE STIMULATED EXOCRINE PANCREATIC SECRETION IN MAN [Abstract]. (Eng.) Angelini, G.; Cavallini, G.; Rosa, B.; Bertini, C.; Adamo, S.; Zuniga, G.; Scuro, L. A. (Clinica Medica III, Verona, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):9; 1977.

3618 CALCIUM BINDING TO RAT PANCREAS MICROSOMAL MEMBRANES [Abstract]. (Eng.) Argent, B. E.; Case, R. M.; Hirst, F. C.; Scott-Wilson, C. J. (Univ. Medical Sch., Newcastle upon Tyne NE1 7RU, England). *J. Physiol. (Lond.)* 273(2):69P-70P; 1977.

3619 THE EXOCRINE PANCREATIC SECRETION AND IMMUNOREACTIVE SECRETIN (IRS) RELEASE AFTER INTRADUODENAL INSTILLATION OF BILE IN MAN [Abstract]. (Eng.) Osnes, M.; Hanssen, L. E.; Flaten, O.; Myren, J. (Ulleval Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):67; 1977.

3620 NONPARALLEL PANCREATIC SECRETION IS NOT NECESSARILY INDUCED BY ENZYME-SPECIFIC HORMONES [Abstract]. (Eng.) Dagorn, J. C.; Estival, A. (INSERM U 31, 13009 Marseille, France). *Digestion* 16(1/2):208; 1977.

3621 PANCREATIC EFFECTS OF MAJOR RESECTIONS OF SMALL INTESTINE IN THE RAT [Abstract]. (Eng.) Germain, M.; Gremillet, C.; Avci, C. (Hopital de Vaugirard, 389 rue de Vaugirard, 75015 Paris, France). *Ir. J. Med. Sci.* 146(Suppl. 1): 48-49; 1977.

3622 THE EFFECT OF ETHANOL AND ACETALDEHYDE ON EXOCRINE PANCREATIC FUNCTION IN NORMAL AND CHRONIC ALCOHOLIC RATS [Abstract]. (Eng.) Demol, P.; Andersen, B. N.; Sarles, H. (INSERM U 31, 46 Chemin de la Gaye, 13009 Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1):48; 1977.

3623 IN VIVO AND IN VITRO EVIDENCE FOR A DIRECT EFFECT OF BOMBESIN AND LITORIN ON THE RAT PANCREAS [Abstract]. (Eng.) Adler, M.; Deschodt-Lanckman, M.; Robberecht, P.; Christophe, J. (Free Univ. Brussels Medical Sch., Brussels, Belgium). *Ir. J. Med. Sci.* 146(Suppl. 1):22; 1977.

3624 COMPARISON OF THE RESPONSE OF PANCREATIC ENZYMES TO EXOGENOUS PANCREOZYMIN AND THE LUNDH-BORGSTROM MEAL [Abstract]. (Eng.) Sandle, G. I.; Herman, K.; Hine, P.; Kay, G.; Braganza, J. M. (Royal Infirmary, Manchester, England). *Ir. J. Med. Sci.* 146(Suppl. 1):44; 1977.

3625 EFFECTS OF SYNTHETIC PROSTAGLANDIN ON PANCREATIC EXOCRINE FUNCTION IN THE CONSCIOUS RAT [Abstract]. (Eng.) Bourry, J.; Demol, P.; Sarles, H. (INSERM Unite 31, 46 chemin de la Gaye, 13009 Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1):44; 1977.

3626 CHANGES OF PANCREATIC SECRETION BY COLLECTION THROUGH DUODENOSCOPIC CATHETERS [Abstract]. (Eng.) Lawaets, O.; Henriksen, F. W.; Worning, H. (Inst. Experimental Res. in Surgery, Copenhagen, Denmark). *Ir. J. Med. Sci.* 146(Suppl. 1):45; 1977.

3627 THE EFFECT OF PARTIAL PANCREATECTOMY IN RATS [Abstract]. (Eng.) Pearson, K. W.; Scott, D.; Torrance, H. B. (Manchester Royal Infirmary, Manchester, England). *Ir. J. Med. Sci.* 146 (Suppl. 1):45-46; 1977.

3628 PANCREATIC TRANSPLANTATION IN THE RAT [Abstract]. (Eng.) Germain, M.; Gremillet, C. (Hopital Henri Mondor, 94000 Creteil, France). *Ir. J. Med. Sci.* 146(Suppl. 1):46; 1977.

3629 SIMULTANEOUS STIMULATION OF PANCREATIC AND BILIARY SECRETION BY INTRA-DUODENAL AND INTRA-JEJUNAL PERFUSION OF BILE SALTS IN CATS [Abstract]. (Eng.) Eisenhardt, J. M.; Hotz, J.; Ormai, S.; Schneider, F.; Hartmann, W.; Aufgebauer, J.; Goebell, H. (Medical Clinic, Univ. Essen, Essen, W. Germany). *Ir. J. Med. Sci.* 146(Suppl. 1):47; 1977.

See also, 3541, 3771, 3803, 3849.

SECRETION AND METABOLISM

Hepatobiliary Tract

3630 RAT HEPATOCYTE PRIMARY CELL CULTURES. III. IMPROVED DISSOCIATION AND ATTACHMENT TECHNIQUES AND THE ENHANCEMENT OF SURVIVAL BY CULTURE MEDIUM. (Eng.) Williams, G. M.; Bermudez, E.; Scaramuzzino, D. (American Health Foundation, 1 Dana Rd., Valhalla, NY 10595). *In Vitro* 13(12): 809-817; 1977.

Techniques for dissociation and attachment of rat hepatocytes as well as modifications of the culture medium that enhance *in vitro* survival of the cells are described. The 4-min washout perfusion of livers from adult male Fisher rats was performed with 0.5 mM ethylene glycol-bis-(β-amino ethyl) *N*,*N*'-tetracetic acid in Ca^{++}-Mg^{++}-free Hank's balanced salt solution buffered with 0.05 M *N*-2-hydroxy-ethyl-piperazine-*N*'-2-ethanesulfonic acid (HEPES) to pH 7.2. The 10- to 12-min enzyme perfusion was performed with collagenase solution (100 U/ml) in Williams' medium E (WE) buffered to pH 7.4 with 0.05 M HEPES, and during it, the flow rate was decreased gradually from 40 to 20 ml/min. Following perfusion, cells were detached by combing into fresh collagenase solution, centrifuged at 50 x *g* for 4 min, resuspended with a 25 ml wide-mouthed pipette, and inoculated into 25 cm^2 plastic flasks in 5.0 ml of WE with 10% fetal bovine serum and 50 μg/ml gentamicin. The attachment interval lasted 1.5 hr to permit attachment only of viable cells. The effect of four culture media (Eagle's Minimum Essential Medium, Leibovitz's L-15, Ham's F-12, and a newly formulated medium containing galactose) on attachment and survival of cells was studied. Reduction of the perfusion rate decreases the amount of collagenase solution required. Gradual reduction of the flow rate of the enzyme perfusion did not alter the viability or yield, but preserved the histology of the liver and decreased the amount of collagenase solution required. Dissociation in enzyme solution increased the viability of the final suspension to 69 ± 16% in comparison with 38 ± 17% after dissociation in WE. Postdissociation enzyme exposure (15 min in collagenase and hyaluronidase) reduced the recovery of viable cells from 100 to 64 ± 31% and the attachment efficiency from 30 ± 11 to 11 ± 11% ($p<0.01$) and thus is not recommended. When all the tested procedures were combined into the described modified method, the average percentage of free nuclei decreased (40-10%), the viable cells recovered ($92 \pm 53 \times 10^6$ to $164 \pm 70 \times 10^6$ cells/100 g body weight), the percentage of viable cells increased (43 ± 15 to 79 ± 7%), and the percentage of attachment efficiency increased (25 ± 9 to 42 ± 11%). The volume of medium present during attachment was a critical factor: the 5-ml volume gave a 50% attachment efficiency compared to a 20% attachment efficiency in a 2-ml volume. Additional investigations indicated that the effect was due to enhanced viability of unattached cells in the larger volume environment and not due to dilution of any residual collagenase. Eagle's medium, WE, L-15, and F-12 supported culture survival to similar extents, although average survival in L-15 appeared slightly better than in the others; the newly-formulated, galactose-containing medium was comparable to L-15 in this respect. The improved conditions described enhance the final recovery of viable liver cells and the attachment efficiency of liver cells *in vitro*.

3631 EVALUATION OF HEPATOCELLULAR AND KUPFFER CELL FUNCTION OF THE ISOLATED GUINEA PIG LIVER PERFUSED BY A FLUOROCARBON MEDIUM.

(Eng.) Roeser, H. P.; Cooksley, W. G. E.; Mack, S. (Royal Brisbane Hosp., Herston, Brisbane, 4029, Queensland, Australia). *Gastroenterology* 74(2, Part 1):209-214; 1978.

A synthetic medium for isolated guinea pig liver perfusion, using a fluorocarbon (FC) emulsion as the oxygen-carrying agent, was evaluated for its capacity to maintain liver viability and function. A 10% emulsion of perfluorotributylamine (FC43) was dispersed by a nonionic detergent (Pluronic F68) in a buffered electrolyte solution. The FC43 perfusate was compared with identical media in which FC43 was either omitted or replaced by 20% isologous RBC. Damage to liver cells was assessed by hepatic flow rate, aspartate aminotransferase release, and liver histology. Bile secretion, albumin synthesis, and galactose elimination capacity were used as indices of parenchymal cell function, and Kupffer cell activity was assessed by uptake of colloidal radioactive gold. All three perfusion media satisfactorily maintained liver cell viability, but the two media supplemented with a specific oxygen-carrying agent were associated with significantly superior parenchymal cell function ($p=0.05-0.01$). The performance of the FC and RBC media was not significantly different. The phagocytic activity of Kupffer cells was well sustained by all three media, but the FC medium was superior with large amounts of colloidal gold. Iron release from hepatic parenchymal cells, with the FC medium, was similar to that reported for rat liver preparations, using a RBC perfusate.

3632 HEPATIC CLEARANCE OF DRUGS. III. ADDITIONAL EXPERIMENTAL EVIDENCE SUPPORTING THE "WELL-STIRRED" MODEL, USING METABOLITE (MEGX) GENERATED FROM LIDOCAINE UNDER VARYING HEPATIC BLOOD FLOW RATES AND LINEAR CONDITIONS IN THE PERFUSED RAT LIVER IN SITU PREPARATION.

(Eng.) Pang, K. S.; Rowland, M. (Natl. Inst. Health, Bethesda, MD 20014). *J. Pharmacokinet. Biopharm.* 5(6):681-699; 1977.

The disposition of the lidocaine metabolite, monoethylglycine xylidide (MEGX), was studied in a perfused rat liver *in situ* preparation in an attempt to discriminate further between two models of hepatic drug clearance. In the "well-stirred" model, the liver is regarded as a well-stirred compartment with the emergent drug concentration in equilibrium with that in the liver. In the "parallel tube" model, the liver is viewed as a series of identical parallel units with enzymes distributed evenly around the units. Using a single passage perfusate system, it was found in a previous study that the extraction ratio of lidocaine was maximal and constant (0.997) below 7 mg/l. The steady-state output MEGX concentration appearing in the emergent blood upon a constant and low input concentration of lidocaine (4 mg/l) was determined under varying hepatic blood flow rates (10-16 ml/min/liver). The data suggest that, operationally, the well-stirred model adequately describes the appearance of MEGX from lidocaine.

3633 MASSIVE LIVER ENLARGEMENT ACCOMPANIED BY DECREASED DRUG METABOLISM. EFFECT OF ANTERIOR PITUITARY EXTRACT ON HEPATIC ULTRASTRUCTURE, ZOXAZOLAMINE PARALYSIS, AND METABOLISM IN THE RAT.

(Eng.) Szabo, S.; Garg, B. D.; Kourounakis, P.; Tuchweber, B. (Harvard Medical Sch., Boston MA 02115). *Can. J. Physiol. Pharmacol.* 55(5):1135-1142; 1977.

The relationship between liver enlargement and drug metabolism was investigated in female Sprague-Dawley rats. Hepatomegaly (e.g., 31% increase in liver weight in a 17-day experiment) was induced by injection of lyophylized anterior pituitary (LAP) extract (20 mg, s.c. twice daily for 4-34 days). The liver enlargement seemed to be due to an increase in the number and the size (enhanced water content and PAS-positive material) of hepatocytes. Electron microscopy of the liver revealed slight proliferation of the smooth endoplasmic reticulum and pronounced fragmentation and dilation of the rough endoplasmic reticulum. Zoxazolamine paralysis time was significantly prolonged (+55% and +102%) after 4 and 17 days, resp., of treatment with LAP. Metabolism of zoxazolamine by the 9,000 x *g* supernatant fraction of the liver of rats given LAP for 17 days was reduced by 73%. Thus, the marked hepatomegaly induced by LAP was associated with a prolonged action of the drug, which may result from a decrease in hepatic drug metabolism.

3634 CHOLERESIS AND HEPATIC TRANSPORT MECHANISMS. III. BINDING OF OUABAIN AND K-STROPHANTHOSIDE TO BILIARY MICELLES AND INFLUENCE OF CHOLERESIS ON THEIR BILIARY EXCRETION.

(Eng.) Vonk, R. J.; Van Doorn, A. B. D.; Scaf, A. H. J.; Meijer, D. K. F. (Dept. Pharmacology, State Univ. Groningen, Bloemsingel 1, Groningen, Netherlands). *Naunyn Schmiedebergs Arch. Pharmacol.* 300(2):173-177; 1977.

To investigate binding of drugs to biliary micelles as a possible factor in the hepatic transport process, the interaction of two uncharged compounds, ^{3}H-ouabain and ^{3}H-K-strophanthoside with biliary micelles was studied by ultracentrifugation of rat bile. The bile acids normally present in rat bile were predominantly associated with cholesterol-containing micelles, but not to the same extent. The tendency of the bile salts to be associated with mixed micelles was the greatest for conjugated chenodeoxycholate, lower for conjugated deoxycholate, and the least for conjugated cholate. The sedimentation patterns of the water soluble cardiac glycosides, added *in vitro*, indicated binding to mixed biliary micelles as well as noncholesterol-containing micelles. Mannitol was found to be associated with both categories of biliary micelles. In spite of the binding of cardiac glycosides to the micelles, the administration of taurocholate did not stimulate biliary output of the glycosides. The administration of the choleretics dehydrocholate and ethacrynic acid failed to enhance biliary output of the glycosides. These results indicate that binding of drugs to biliary micelles diminishes the free concentration of drugs in bile and confirm earlier studies with organic anions that binding to biliary micelles is not a pertinent factor in the rate of biliary excretion.

3635 BILE-SALT-DEPENDENT AND INDEPENDENT CHOLERESIS INDUCED BY BUCOLOME IN THE RAT.

(Eng.) Kitani, K.; Morita, Y.; Miura, R.; Kanai, S. (Tokyo Metropolitan Inst. Gerontology, 35-2, Sakaecho, Itabashi-ku, Tokyo 173, Japan). *Can. J. Physiol. Pharmacol.* 55(5):1155-1161; 1977.

The bile salt pool was studied in male Wistar rats in which choleresis was induced by 1-cyclohexyl-5-*n*-butyl-2,4,6-trioxoperhydropyrimidine (bucolome, BC). The rats received BC (20 mg/100 g) i.p. [^{14}C]erythritol and mannitol clearance studies indicated that this choleresis was of canalicular origin. In 1-hr continuous bile collection studies, immediately after the interruption of enterohepatic circulation (acute interruption), the bile flow rate was considerably increased and the bile salt excretion rate was significantly increased ($p<0.05$) in rats that received BC. However, the bile salt excretion rate fell rapidly in BC-administered rats, while the bile flow rate was fairly constant during this 1-hr period. Thus, unlike the situation in control rats, bile flow rate was not significantly correlated with the bile salt excretion rate in BC-administered rats. In rats that had an external bile fistula open for 16-20 hr (chronic interruption of enterohepatic circulation), the bile flow rate was also significantly increased ($p<0.01$) by BC administration, while the bile salt excretion rate was not changed after BC administration. It is suggested that BC induced bile salt-independent choleresis in both experimental rat groups (acute and chronic interruption of enterohepatic circulation). In addition, BC appeared to increase the bile salt-dependent fraction of bile in rats with acute interruption of enterohepatic circulation, possibly by mobilizing the bile salt pooled in the intestinal content and/or intestinal wall.

3636 CHARACTERIZATION OF METHYLUMBILLIFERONE (MENDIAXON®)-INDUCED CHOLERESIS IN THE ISOLATED PERFUSED RAT LIVER.

(Eng.) Kroker, R.; Anwer, M. S.; Hegner, D. (Fachbereich Tiermedizin, Univ. Munchen, Veterinarstr. 13, D-8000 Munchen 22, W. Germany). *Acta Hepatogastroenterol.* 24(5):348-354; 1977.

Studies were performed on isolated perfused livers from male Wistar rats to characterize the influence of the choleretic drug, methylumbilliferone, on bile formation. In experiments on the time-dependent influence of methylumbilliferone (10 mg/liver), the drug increased bile acid secretion (from 34 to 61 nmol/g liver), bile flow (from 14.8 to 28 µl/g liver), and sodium excretion (from 2.5 to 5.0 µmol/g liver), all within 20 min of the addition of the drug. Bile acid secretion decreased to 3.5 nmol/g liver by 100 min after addition of the drug (60 min of perfusion), compared to a value of 14 nmol/g in controls at this time. Methylumbilliferone was shown not to affect the assay used for bile acid estimation. The dose-dependent effect of methylumbilliferone on bile flow and bile acid secretion was examined. The maximal effect was observed at a final concentration of 1.13 mM, resulting in a 110% increase of bile flow and a 150% increase in bile acid secretion; concentrations below 5.6 mM did not alter either parameter. The erythritol clearance rate was measured before and after the administration of methylumbilliferone and plotted against bile flow, yielding a slope of essentially 1 in both cases. This result indicates that all the bile is of canalicular origin. Calculation of the relative increases of sodium excretion and bile flow yielded a significantly correlated ($r=0.99$) regression line, which indicates that the increased bile flow was due in part to the elevated sodium excretion. Analysis of the bile for the hydrolyzed drug demonstrated that the increased bile flow was also due in part to the excreted portion of methylumbilliferone. These results indicate the complexity of hepatic organic anion excretion.

3637 THREE METHODS FOR MEASURING THE INCREASE IN THE CAPACITY OF THE DISTENDED BILIARY TREE IN THE RAT PRODUCED BY α-NAPHTHYLISOTHIOCYANATE TREATMENT.

(Eng.) Olson, J. R.; Fujimoto, J. M.; Peterson, R. E. (Medical Coll. Wisconsin, Wilwaukee, WI 53233). *Toxicol. Appl. Pharmacol.* 42(1):33-43; 1977.

As one step in attempting to understand structure-function relationships, studies aimed at measuring one structural feature were undertaken. The capacity of the distended biliary tree was measured in male Sprague-Dawley rats by three techniques: retrograde intrabiliary injection (RII), segmented retrograde intrabiliary injection (SRII), and retrograde pushback (RPB). Biliary tree distention was produced by the administration of α-naphthylisothiocyanate (ANIT, 45 mg/kg/day) in olive oil by gavage for 8 days. Control rats, which received 0.2 ml of olive oil daily for 8 days, had distended capacities of 33.4 ± 2.7, 34.1 ± 3.4, and 31.6 ± 2.9 µl by the RII, SRII, and RPB techniques, resp., at 15 days after the treatment. In treated rats, the RII, SRII, and RPB techniques gave distended biliary capacities of 48.0 ± 1.6, 47.5 ± 1.4, and 46.8 ± 1.3 µl, resp. In controls, the two-way analysis of variance showed no significant difference between the three methods. For each of the three methods, the mean distended biliary tree capacity of the ANIT-treated rats was significantly greater than the control rats ($p<0.02$). No significant difference was found between control and ANIT-treated rats for mean liver weights and biliary capacity with ANIT treatment was not accompanied by any change in liver weight or bile flow rate.

3638 ROLE OF KUPFFER CELLS AND SUPPRESSOR T CELLS IN THE GRAFT VERSUS HOST REACTION AFTER INTRAHEPATIC LYMPHOID TISSUE IMPLANTATION.

(Eng.) Vuitton, D.; Eloy, R.; Clendinnen, G.; Grenier, J. F. (Unit Surgical Res. and Biophysiopathology of the Intestine, Ave. Moliere, 67200 Strasbourg/Hautepierre, France). *Cell. Immunol.* 34(1):138-145; 1977.

Semiallogeneic lymph nodes were implanted into the livers of August (AgB$_3$) x Lewis (AgB$_1$) rats to study the roles of Kupffer cells and suppressor thymus-derived lymphocytes (T cells) in the immunosuppressive function of the liver during the graft-versus-host (GVH) reaction. In some animals, suppressor T cells were impaired by adult thymectomy 10 weeks before the induction of GVH reaction, and, in others, blockade of Kupffer cells was achieved by the injection of colloidal substrate at the time of antigen recognition; thus the effects of each type of cell on immunosuppressive function of the liver were studied separately. The development of a severe clinical GVH reaction and a near-50% mortality between the 4th and 10th postoperative days among thymectomized rats showed that the protective role played by the liver in the reaction to intrahepatic implantation of semiallogeneic lymphoid tissue is severely impaired by thymectomy 10 weeks prior to implantation. In contrast, impairment of the function of Kupffer cells by gelatin uptake did not result in a lethal GVH reaction. Histological changes observed in the spleen of thymectomized rats included cellular depletion of the white pulp and intense lymphoblastic proliferation in the red pulp 8 days after lymph node implantation. The cellular depletion of white pulp was still present at 15 days after implantation, while the cellular infiltration of the red pulp disappeared almost completely. Postmortem examination on the 6th day after lymph node implantation revealed severe lymphoid atrophy that might be related to the lethal GVH reaction. The results suggest that a subpopulation of the recipient's short-lived T cells is involved in the immunosuppressive function of the intact liver and that Kupffer cells are not an essential component of the protective mechanisms of the liver.

3639 HEPATIC BLOOD FLOW MEASUREMENT.

(Eng.) Nxumalo, J. L.; Teranaka, M.; Schenk, W. G., Jr. (Dept. Surgery, State Univ. New York at Buffalo, Buffalo, NY). *Arch. Surg.* 113(2):169-172; 1978.

A comparison was made between total hepatic blood flow measured by the single injection of indocyanine green (0.5 mg/kg) and the electromagnetic flow methods in the dog, in which circulatory overload was induced by dextran 40 infusion (2.0% of body weight over 30 min). While there was close correlation between the values obtained by the two methods in normal dogs, hepatic blood flow was overestimated by 40-60% by the indirect indocyanine green method following dextran infusion if the electromagnetic method was used as a comparison standard. One possible explanation for the puzzling finding that the total hepatic blood flow as measured by the indocyanine green clearance method was larger than that measured by the electromagnetic flow method may be that there was a decreased extraction ratio after dextran infusion.

3640 BLOOD FLOW IN NORMAL AND CHOLESTATIC DOG LIVER AS MEASURED BY INTRAPARENCHYMAL INJECTION OF XENON 133.

(Eng.) Hall, C.; Bergan, A.; Henriksen, J. E. (Rikshospitalet, Langesgt., Oslo 1, Norway). *Eur. Surg. Res.* 9(5):357-363; 1977.

Parenchymal liver blood flow, as reflected by the washout of intraparenchymally injected ^{133}Xe, was studied at different stages of total cholestasis in the dog over a 3-week period. In three dogs, the gallbladder was removed and the common bile duct was divided between ligatures, resulting in total cholestasis. Three other dogs served as controls. In dogs subjected to total cholestasis, the median parenchymal liver blood flows measured after 1 hr, 7 days, 14 days, and 21 days of cholestasis were 53.2 (range, 40.4-67.5), 51.7 (range, 39.1-57.4), 59.3 (range, 49.2-71.9), and 51.7 (range, 30.3-77.6) ml/min/100 g liver tissue, resp., compared with median flow values in control dogs of 50.4 (range, 39.7-82.0), 41.0 (range, 34.0-54.2), 47.9 (42.9-63.1), and 45.4 (35.9-52.3) ml/min/100 g liver tissue, resp. The differences found between measurements obtained from cholestatic and normal dog livers were not statistically significant at any stage of the experiment. Thus cholestasis does not appear to influence parenchymal liver blood flow in the dog. Histograms of the results obtained from normal and cholestatic and normal dogs were plotted weekly, and it was concluded from these that cholestasis also does not influence the distributive pattern of the obtained flow values. However, the method applied in this experiment does not give information about blood flow through eventual anastomoses or about the relative contribution of the portal venous and the hepatic arterial system to the flow measured. The above results do not agree with most of the previously reported studies on parenchymal liver blood flow. The reason for the disparity may lie primarily in the variety of methods utilized and also in the lack of objective assessment of the actual cholestatic damage induced in different studies at various time intervals.

3641 CORRELATION BETWEEN XENON-133 RECTUM-TO-HEART TIME AND PORTAL VENOUS HEMODYNAMICS.

(Eng.) Ludewig, R. M.; Castell, D. O. (Eastern Virginia Medical Sch., 600 Gresham Drive, Norfolk, VA 23507). *J. Surg. Res.* 24(2):92-96; 1978.

The relationship between portal venous resistance and the time in which ^{133}Xe is transported from the rectum to the heart (RHT) was studied in dogs, to determine whether this marker could be used for evaluating the patency of surgically created portasystemic shunts. The RHT was determined in normal dogs (mean portal venous pressure [PVP]=9.3 cm H_2O), dogs with partially occluded portal veins (mean PVP, 25 cm H_2O), and dogs with totally occluded portal veins (mean PVP, 52 cm H_2O). During each incremental rise in PVP, the ^{133}Xe RHT increased significantly ($p<0.001$). The mean RHT in normal dogs rose from 74 to 250 sec when the portal vein was totally occluded. The results indicate that the ^{133}Xe RHT may be a useful parameter for determining the patency of surgically created portasystemic anastomosis. Further studies will be necessary to determine the effect of naturally occurring portasystemic shunts on the RHT and to support the validity of the test in the presence of developed collaterals.

3642 CLINICAL STUDY OF LIVER BLOOD FLOW IN MAN MEASURED BY ^{133}Xe CLEARANCE AFTER PORTAL VEIN INJECTION. (Eng.) Sherriff, S. B.; Smart, R. C.; Taylor, I. (Sheffield Royal Infirmary, England). *Gut* 18(12):1027-1031; 1977.

Liver blood flow was determined by ^{133}Xe clearance in 14 conscious patients with colorectal cancer, in whom the value of adjuvant liver perfusion of 5-fluorouracil was also being tested. Access to the portal circulation was achieved by dilatation and cannulation of the obliterated umbilical vein. The clearance from the liver of a bolus of ^{133}Xe was monitored using a gamma-ray camera so that blood flow from different areas of the liver could be calculated. The clearance curve of ^{133}Xe was a double exponential of which the initial fast component accounted for a consistently high proportion of the total clearance. The perfusion studies have shown wide differences in blood flow to the various areas of the liver in the same patient, in addition to a wide variation in perfusion rate between the 14 patients. This technique of quantitative estimations of liver blood flow to different areas of the liver may have importance in planning operative procedures and understanding the hemodynamic mechanisms involved in liver disease.

3643 HEPATIC VASCULATURE: A CONCEPTUAL REVIEW. (Eng.) Lautt, W. W. (Coll. Medicine, Univ. Saskatchewan, Saskatoon, Saskatchewan S7N OWO, Canada). *Gastroenterology* 73(5):1163-1169; 1977.

Information concerning the hepatic circulation is reviewed, with emphasis on the role of hepatic blood vessels in hepatic and homeostatic functions. Contrasts are made with resistance, capacitance, and fluid exchange functions in other better known vascular beds. Hemodynamic changes that produce shifts in fluid exchange in other tissues are without effect in the liver. Elevations of hepatic venous pressure are transferred quantitatively to the sinusoids and result in prolonged, massive fluid filtration into the abdominal cavity. Other factors that are involved with control of fluid exchange are discussed. The liver contains a large volume of blood that can be rapidly mobilized during hemorrhage. The hepatic circulation is highly sensitive to changes in circulating blood volume and serves as a major buffer for expanded or contracted blood volume. Control of hepatic blood flow and the reciprocal relationship between portal and hepatic arterial flow is discussed. Changes in hepatic blood flow produce marked changes in hepatic clearance rates of a wide variety of compounds. It is concluded that the hepatic artery is not controlled by local tissue metabolism but rather is controlled by a mechanism that tends to maintain hepatic blood flow (and therefore clearance rates) constant.

3644 THE EFFECT OF HYPERTONIC INFUSIONS ON HEPATIC BLOOD FLOWS AND LIVER VOLUME IN THE CAT. (Eng.) Lautt, W. W.; MacLachlan, T. L.; Brown, L. C. (Coll. Medicine, Univ. Saskatchewan, Saskatoon, Saskatchewan S7N OWO, Canada). *Can. J. Physiol. Pharmacol.* 55(6):1339-1344; 1977.

The effects of i.v. and intraportal infusions of hypertonic NaCl and glucose solutions on the resistance and capacitance vessels were studied in the intact feline liver. All doses infused produced vasodilation of the hepatic artery. A rough estimate would suggest that the tonicity changes equal to those seen after hemorrhage might produce an increase of arterial conductance to no less than 110% and no greater than 140% of control conductance. In response to i.v. infusions, portal flow increased to the same extent as did arterial flows. The resistance vessels were equally affected by equal osmolal loads of glucose or NaCl, but the hepatic volume changes were quite different depending on the substances infused. In marked contrast with the resistance vessel response to hypertonic NaCl, the hepatic capacitance vessels did not dilate. Liver volume decreased. Cessation of the infusion resulted in increases of hepatic volume to above control levels. Glucose produced consistent steady increases in volume that may have been associated with fluid uptake by the hepatocytes in conjunction with glucose uptake.

3645 THE EFFECT OF INCREASED INFERIOR VENA CAVA PRESSURE ON HEPATIC CIRCULATION IN THE DOG. (Eng.) Sugar, I.; Jakab, F.; Szabo, G. (Semmelweis Univ. Medical Sch., Mezo Imre ut 17, H-1430, Hungary). *Res. Exp. Med.* 171(3):263-270; 1977.

The effect of increased inferior vena cava pressure (IVCP) on hepatic circulation was studied in dogs. IVCP was raised by a balloon catheter introduced via the jugular vein. Hepatic artery flow (HAF) and portal venous flow (PVF) were measured with the electromagnetic flow meter. The increase of IVCP uniformly reduced HAF and PVF; the relative contribution of the two vessels to the HBF did not change. The relationship between IVCP increase and HAF reduction and between the decrease of hepatic artery (AP) IVCP and the reduction of HAF was linear. There was no sign of autoregulation or vasomotor regulation of HAF. The changes in IVCP were only partially transmitted to the portal venous pressure (PVP). There was no change in intrahepatic portal resistance with increased IVCP. The increase in PVP did not lead to resistance changes in the splanchnic circulation. As a sign of the autoregulation of splanchnic circulation, the AP-PVP-versus-PVF curve was concave to the pressure axis. As a result of opposing autoregulatory and vasomotor influences in the intact animal, the hepatic circulation appears to react passively to the increased outflow pressure.

3646 COMPARISON OF THE METABOLISM OF CHYLOMICRONS AND CHYLOMICRON REMNANTS BY THE PERFUSED LIVER.

(Eng.) Gardner, R. S.; Mayes, P. A. (Royal Veterinary Coll., London NW1 OTU, England). *Biochem. J.* 170(1):47-55; 1978.

The hepatic metabolism of chylomicrons and chylomicron remnants was compared after adding approximately equal numbers of each lipoprotein particle to the perfusate of isolated rat livers. At least 40% of the added remnants were metabolized by the liver, compared with less than 3% for chylomicrons. There was significantly more net removal of labeled remnants than of chylomicrons by the liver ($p<0.001$). A greater proportion of labeled cholesterol than of labeled triacylglycerol fatty acids was transferred to the liver from each lipoprotein. Cholesteryl esters of remnants were hydrolyzed, and triacylglycerol fatty acids of remnants were oxidized to CO_2 more extensively than those of chylomicrons. There was greater oxidation of remnant glycerolipid [1-^{14}C]oleate than of glycerolipid [1-^{14}C]palmitate. A large fraction of the fatty acids of remnants, but not of chylomicrons, was transferred to phospholipids, which were released by the liver in a lipoprotein of relative density less than 1.006. Label from remnants, but not from chylomicrons, was found in lipoproteins of relative density of over 1.006, which were not released during perfusion but could be flushed out from the liver at the end of perfusion. There are significant qualitative and quantitative differences in the metabolism of chylomicrons and chylomicron remnants.

3647 BILIARY EXCRETION OF SOME ANIONIC DERIVATIVES OF DIETHYLSTILBOESTROL AND PHENOLPHTHALEIN IN THE GUINEA PIG.

(Eng.) Barford, P. A.; Olavesen, A. H.; Curtis, C. G.; Powell, G. M. (Dept. Biochemistry, Univ. Coll., P.O. Box 78, Cardiff CF1 1XL, Wales). *Biochem. J.* 168(3):373-377; 1977.

The metabolic fates and modes of excretion of diethylstilbestrol mono[^{35}S]sulfate and diethylstilbestrol di[^{35}S]sulfate were studied in guinea pigs. Comparative studies were also made with [G-^{3}H]diethylstilbestrol and phenolphthalein di[^{35}S]-sulfate. Diethylstilbestrol di[^{35}S]sulfate (1 mg/0.2 ml water/200 g) was extensively eliminated in the bile unchanged. After the administration of diethylstilbestrol mono[^{35}S]sulfate, extensive biliary elimination of radioactivity was also recorded. Radioactive components were identified as diethylstilbestrol disulfate, diethylstilbestrol monosulfate monoglucuronide, and unchanged diethylstilbestrol monosulfate. When [G-^{3}H]diethylstilbestrol was administered, ^{3}H-labeled diethylstilbestrol monoglucuronide, diethylstilbestrol monosulfate monoglucuronide, and diethylstilbestrol disulfate appeared in the bile. Phenolphthalein di[^{35}S]sulfate was excreted unchanged in bile. These findings are discussed in relation to studies carried out in the rat, and species differences are related to differences in enzyme activities in rat and guinea-pig liver.

3648 ORNITHINE DECARBOXYLASE ACTIVITY AND THE ONSET OF DEOXYRIBONUCLEIC ACID SYNTHESIS IN REGENERATING LIVER.

(Eng.) McGowan, J. A.; Fausto, N. (Div. Biology, Brown Univ., Providence, RI 02912). *Biochem. J.* 170(1):123-127; 1978.

Ornithine decarboxylase activity and polyamine concentrations were measured in regenerating livers of protein-deprived and hypophysectomized male Holtzman rats. Compared with normally fed animals, rats fed on a low-protein diet for 3 days exhibited a considerable delay in DNA synthesis after partial hepatectomy. In the regenerating livers of these animals, the timing of the first peak of ornithine decarboxylase activity was not altered. The second peak of enzyme activity was delayed by a few hours, but polyamine concentrations were similar to those of normally fed rats. The results suggest that, regardless of the possible effect of polyamines on DNA synthesis, the time course of ornithine decarboxylase activity appears to be independent of the onset of DNA replication in regenerating livers.

3649 FATTY ACID SYNTHESIS IN THE REGENERATING LIVER OF THE RAT.

(Eng.) Gove, C. D.; Hems, D. A. (St. George's Hosp. Medical Sch., Cranmer Terrace, London SW17 ORE, England). *Biochem. J.* 170(1):1-8; 1978.

Synthesis *de novo* of fatty acids in the rat liver was measured during regeneration by determining ^{3}H incorporation from ^3H_2O into fatty acids. Fatty acid synthesis, measured per gram of wet weight of tissue, was increased by a factor of about 2 between 1 and 4 days after partial hepatectomy, compared with rates in sham-operated control rat livers. There were no associated changes in the rates of liver cholesterol synthesis or of fatty acid synthesis in adipose tissue in rats after partial hepatectomy, compared with rates in sham-operated rats. In regenerating livers, perfused under three different conditions, there was no alteration in the capacity for fatty acid synthesis compared with that of control rats. The increased synthesis of fatty acids in regenerating liver was associated with insignificant increases in plasma concentrations of triacylglycerols and free fatty acids, with a decrease in content of liver glycogen, and with no change in hepatic activity of acetyl-coenzyme A carboxylase. The accelerated rate of fatty acid synthesis in regenerating liver appears not to be due to any intrinsic alteration in hepatic capacity for fatty acid synthesis, but it may be caused by the continuous action on liver of unidentified circulating factors.

3650 PHOSPHOLIPIDS IN ENDOPLASMIC RETICULUM--THEIR RELATIONSHIP TO DRUG METABOLISM IN EXPERIMENTAL LIVER DISEASE.

(Eng.) Gallenkamp, H. (Medizinische Universitatsklinik, Josef-Schneider-Str. 2, D-8700 Wurzburg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):309-316; 1977.

The effect of depletion or accumulation of phospholipids on membrane activity is reviewed, relying upon studies of choline deficiency in rats fed a choline-deficient diet (CDD) as an experimental model. Short-term choline deficiency tended to produce fatty liver and caused a remarkable decrease in phospholipid content in plasma and brain, while the alterations in liver microsomes were less pronounced. Within 24 hr, changes occurred in the floating lipid fraction of the liver homogenate; later, a general reduction of phospholipids, especially phosphatidylcholine, and a slight decrease in phosphatidylethanolamine. The protein content was largely unchanged in the first 5 days, but after 8 and 15 days, there were significant reductions in the microsomal protein content, and the cytochrome P450 content was slightly depressed. During acute (3-week) choline deficiency, the activity of several microsomal drug metabolizing enzymes (e.g., coumarin hydroxylase, hexobarbital oxidase, aminopyrine and ethylmorphine demethylase) decreased. Prolonged choline deficiency (up to 140 days) resulted in a fall of the plasma and brain phospholipid content, while the total microsomal phospholipid content in the liver was unchanged, and drug metabolizing activity was found to be normal both *in vivo* and *in vitro*. It is hypothesized that drug metabolizing activity in isolated microsomes or *in vivo* may depend on a balance of endoplasmic constituents and thus on a normal total phospholipid content and normal distribution of the phospholipid fraction and fatty acids and that imbalances lead to liver disease states. Under conditions of α-naphthyisocyanate-induced cholestasis, UDP-glucuronyl transferase activity was elevated, cytochrome P450 content was lowered, and microsomal protein content was elevated. In galactosamine-induced hepatitis, there was a decrease in cytochrome P450 content, a 2.5-fold increase in phospholipids, a ninefold increase in neutral lipids, and an elevation in the microsomal UDP-glucuronyl transferase activity. The elevation of the latter enzyme in both models of hepatocellular damage can be tentatively explained by an alteration in membrane structure. The role of phospholipids in human liver disease lacks firm proof because there is no information available about content and composition of phospholipids in human liver, so therapeutic use of essential phospholipids is controversial. There seems to be no established correlation between phospholipid content in liver disease and *in vivo* activity of drug-metabolizing enzymes.

3651 CHANGES IN RAT SERUM LIPOPROTEINS FOLLOWING LIGATION OF THE BILE DUCT.

(Eng.) Hinton, R. H.; Mullock, B. M. (Wolfson Bioanalytical Center, Univ. Surrey, Guildford, Surrey GU2 5XH, England). *Clin. Chim. Acta* 82(1/2):31-44; 1978.

The serum lipoproteins of normal and of cholestatic rats were studied by crossed immunoelectrophoresis coupled with separations by rate and isopycnic density gradient centrifugation and by gel exclusion chromatography. Normal rat serum contained distinct lipoprotein species closely analogous to human very low density lipoprotein, low density lipoprotein, low density component of high density lipoprotein, and high density component of high density lipoprotein (VLDL, LDL, HDL_2, and HDL_3, resp.). Three days after common bile duct ligation, there were major changes in the lipoproteins of rat serum. The amounts of VLDL, LDL, and of a minor HDL component were elevated, and several novel types of lipoprotein were detected. Three of these were identified as the characteristic lipoprotein of cholestasis, lipoprotein x, as an enlarged and modified HDL, and as a lipoprotein of density 1.055 g/ml intermediate in size between LDL and VLDL. Some unusually small VLDL particles were also detected. It is concluded that the changes in rat serum lipoproteins following common bile duct ligation are very similar to the changes observed in cholestatic disease in human patients.

3652 MECHANISM OF SECRETION OF BILIARY LIPIDS: ROLE OF A MICROTUBULAR SYSTEM IN HEPATOCELLULAR TRANSPORT OF BILIARY LIPIDS IN THE RAT.

(Eng.) Gregory, D. H.; Vlahcevic, Z. R.; Prugh, N. F.; Swell, L. (Veterans Admin. Hosp., Richmond, VA 23249). *Gastroenterology* 74(1):93-100; 1978.

The role of microtubules in the hepatocellular transport of biliary lipids was investigated, using the actively secreting isolated rat liver perfusion model and the microtubular blocking agents, vinblastine and colchicine. The liver was perfused with sodium taurocholate (12 μmol/hr) to produce active lipid secretion for 90 min before vinblastine administration and for 60 min before colchicine. The vinblastine- and colchicine-treated livers were then perfused for an additional 60 and 120 min, resp. Control groups received isotonic saline. Specific and nonspecific hepatic metabolic functions, including perfusion flow rates, protein and lecithin synthesis, bile acid uptake, and cytidine diphosphate choline 1,2-diglyceride transferase activity were not significantly altered by vinblastine (1×10^{-5} M or 5×10^{-5} M). Similarly, colchicine administration (5×10^{-6} M) had no effect on flow rates, protein synthesis, biliary lecithin metabolism, oxygen consumption, and β-hydroxybutyrate perfusate concentrations; colchicine did depress perfusate acetoacetate concentration by 33%. These viability criteria validate the metabolic integrity of this model for studying biliary lipid transport. Biliary lipid secretion and bile flow were significantly inhibited by both blocking agents at all concentrations. The selective effect on phospholipid and cholesterol output, however, was greater than for either bile acids or flow. These data support the concept that biliary lipids are secreted by a heterogeneous and complex transport process and also provide definitive evidence that the hepatocyte microtubular network participates in the translocation of lipids from microsomes to the canalicular membrane.

3653 HEPATIC METABOLISM OF MEDIUM CHAIN TRIGLYCERIDES. (Eng.) Bach, A.; Debry, G.; Metais, P. (Hopital Civil, Strasbourg, France). *Bibl. Nutr. Dieta* (25):24-35; 1977.

The hepatic metabolism of medium-chain triglycerides (glycerol esters whose fatty acids contain between 6 and 12 carbon atoms) is reviewed. Medium-chain triglycerides are only slightly integrated into the hepatic lipids (octanoic acid is 6-18 times less incorporated into hepatic lipids by rat liver slices than is palmitic acid) and are mostly oxidized. This oxidation strongly activates ketogenesis and leads to a considerable rise in the redox potential in hepatocytes. After their ingestion, medium-chain triglycerides are hydrolyzed completely into fatty acids and their intestinal absorption is more complete and more rapid than that of long-chain triglycerides. Also, medium-chain triglycerides rely much less on the intestinal concentration of bile and pancreatic lipase than do long-chain triglycerides. The present utilization of medium-chain triglycerides principally concerns malabsorption syndromes, irrespective of whether the cause is surgical or medical or whether the origin is digestive, biliary, or pancreatic. The use of medium-chain triglycerides is contraindicated in all states of acidosis.

3654 BILE COMPOSITION IN RELATION TO RACE AND DIET: STUDIES IN RHODESIAN AFRICANS AND BRITISH SUBJECTS. (Eng.) Heaton, K. W.; Wicks, A. C. B.; Yeates, J. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* (University Park Press: Baltimore, MD): 197-202; 1977.

Differences in the composition of gallbladder bile were investigated in age- and sex-matched groups of urban Britons and urban and rural Africans, and an attempt was made to relate these differences to diet and nutritional status so that an explanation of the differing gallstone prevalence among these groups might be advanced and a clue to the etiology of gallstones obtained. Comparisons were made among three groups of men and between two groups of women: 12 British urban youths, 12 African urban youths, and 11 African rural youths on one hand and 12 British urban women and 10 African rural women on the other. The data collected consisted of their height and weight, an assessment by dietary recall of sucrose intake (in Africans only), and analysis of fasting plasma and duodenal bile.
The total concentration of biliary lipids was usually greater in the African youths, averaging twice as high as in the British youths, suggesting that bile is more concentrated in African gallbladders. Pronounced differences were also found in the relative proportions of bile acids, phospholipids, and cholesterol in the bile of Britons and Africans, the values being 72 versus 82%, 24 versus 15.5%, and 4 versus 2.5%, resp. There was no significant difference among the male groups with respect to the relative proportions of cholate and chenodeoxycholate. However, deoxycholate was significantly more abundant in the bile of urban Britons than in that of rural Africans ($p<0.05$) or in that of Africans combined ($p<0.02$), due, perhaps, to the high cereal fiber intake of the African subjects (Rhodesians). In the women, the proportions of cholate, chenodeoxycholate, and deoxycholate were indistinguishable between African and British subjects. But as in the youths, the bile acids were significantly higher ($p<0.01$) and the phospholipid and cholesterol levels significantly lower ($p<0.02$ and $p<0.02$, resp.) in the African women. In both the male and female study groups, the cholesterol saturation index of the bile was not useful in distinguishing the groups. The glycine:taurine conjugation ratio in all the African youths or in the rural African youths alone was significantly higher than in the British youths ($p<0.05$ and $p<0.01$) and significantly higher in the African women than in the British women ($p<0.002$). These differences may also be due to the high fiber content of the Rhodesian diet. No significant relationship was found between the cholesterol saturation of bile and either body fatness (judged by weight relative to height), estimated sucrose intake, relative amount of chenodeoxycholate in bile, or percentage deoxycholate in bile.

3655 DISTRIBUTION OF BILE ACIDS IN RATS. (Eng.) Uchida, K.; Okuno, I.; Takase, H.; Nomura, Y.; Kadowaki, M.; Takeuchi, N. (Shionogi Res. Lab., Fukushima-ku, Osaka 553, Japan). *Lipids* 13(1):42-48; 1978.

The distribution and biliary and fecal excretion of bile acids were examined in male Wistar rats of about 300 g. The bile acid pool size of the rats on ordinary diet was 40 mg/rat, biliary secretion was 14 mg/hr, and fecal excretion was 10 mg/day. Bile acids were mainly located in the small and large intestinal contents (87% and 10%, resp., of the pool), but a portion was found in the intestinal wall and the liver. Rats fed 2% cholesterol-supplemented diet for 1 week showed similar values for pool size and biliary secretion with the rats on ordinary diet, but higher values for fecal excretion and distribution ratio in the large intestinal contents. Cholic acid was a major component in the bile, small intestinal wall, small intestinal content and liver, while the bile acid composition ratios were similar to each other, although a relatively large amount of α-muricholic acid was found in the intestinal wall and liver. Both the wall and content compositions of the large intestine were similar to that of the feces, in which lithocholic, deoxycholic, α- and β-muricholic acids were the main components, although the ratios of α- and β-muricholic acids in the large intestinal wall were larger than those in the intestinal contents or feces. The high concentrations of these bile acids may indicate a difference of transport velocity across the cell membrane.

3656 THE EFFECT OF FEEDING ON THE BILE SALT-INDEPENDENT CANALICULAR SECRETION IN DOGS.

(Eng.) Austin, G. L.; Johnson, S. M.; Shires, G. T., III; Jones, R. S. (Duke Univ. Medical Center, Durham, NC 27710). *Am. J. Surg.* 135(1):36-39; 1978.

The effect of feeding on canalicular secretion was investigated in conscious dogs. Three dogs were prepared by cholecystectomy, ligation of the lesser pancreatic duct, and insertion of cannulas into the duodenum and stomach. Bile was collected by cannulating the common bile duct through the duodenal cannula. Canalicular secretion was estimated by the biliary clearance of erythritol. Feeding caused increased bile flow ($p<0.05$ at 3-4 hr), increased erythritol clearance ($p<0.05$ at 1 and 2 hr after feeding), decreased bile salt concentration ($p<0.05$ at 2 hr), and unchanged bile salt output. These findings indicate that feeding stimulated the bile salt-independent canalicular secretion.

3657 BILE ACID-INDUCED INCREASE IN BILE ACID-INDEPENDENT FLOW AND PLASMA MEMBRANE NaK-ATPase ACTIVITY IN RAT LIVER.

(Eng.) Wannagat, F. J.; Adler, R. D.; Ockner, R. K. (Reginharstr. 30, D-506 Bensberg, W. Germany). *J. Clin. Invest.* 61 (2):297-307; 1978.

The mechanism for the significant increase in bile acid-independent secretion, expressed per mass of secreting parenchyma and seen in the livers of both selectively obstructed and bile acid-loaded rats, was investigated. Relative to controls, bile acid-independent flow per gram of nonobstructed liver was increased approximately threefold in selectively obstructed rats and 43% in bile acid-loaded rats with normal ducts. In rats infused with bile acids at similar rates for only 16 hr, no increase was observed. Studies with $[^{14}C]$erythritol suggest that the increased bile flow under these conditions was of canalicular origin. NaK-ATPase activity in canaliculi-enriched liver plasma membrane preparations from the nonobstructed lobes of selectively obstructed rats and from 48-hr bile acid-loaded rats was increased by 47% and 52%, resp., relative to controls, but was not increased in membranes from 16-hr bile acid-loaded rats. Canalicular membrane 5'-nucleotidase and Mg ATPase activities also were increased. These studies show that augmented bile acid flux through secreting liver causes an adaptive increase in bile acid-"independent" flow and in the activity of canalicular membrane enzymes. The mechanism by which bile acids modulate this and previously reported aspects of bile secretion remains to be elucidated.

3658 DEPENDENCE OF THE BILIARY EXCRETION OF IOPANOIC ACID ON BILE SALTS.

(Eng.) Loeb, P. M.; Barnhart, J. L.; Berk, R. N. (Presbyterian Hosp., 8200 Walnut Hill Lane, Dallas, TX 75231). *Gastroenterology* 74(2, Part 1):174-181; 1978.

The extent to which iopanoate excretion in bile is dependent upon bile salt excretion was investigated in unanesthetized dogs with bile fistula. The biliary excretion of iopanoate was studied at four different rates of bile salt excretion in separate experiments produced by interruption of the enterohepatic circulation without bile salt infusion and by infusing sodium taurocholate at three constant rates (0.48, 1.87, and 3.21 µmol/min/kg). Iopanoic acid was infused in stepwise increasing rates in each of the four groups of experiments. The maximum excretion of iopanoate into bile (E_{max}) was derived from a computer fit of the relation between the biliary excretion rate and plasma concentration of iopanoate for each of the four rates of bile salt excretion. The calculated E_{max} was closely linked to the rate of bile salt excretion. The E_{max} increased in an apparent linear manner from 0.20 to 2.36 µmol/min/kg as the rate of bile salt excretion increased from 0.21 to 2.62 µmol/min/kg. From the slope of the relation between the biliary excretion of bile salts and the E_{max} of iopanoate, it was determined that 0.89 µmol of iopanoate was coupled with each µmol of bile salt. However, at low plasma concentrations of iopanoate (<0.06 µmol/ml), when maximum transport of the compound was not obtained, increasing rates of taurocholate infusion did not affect the biliary excretion of iopanoate. If these data in dogs can be extrapolated to man, the enhancement of the biliary excretion of iopanoate by bile salts indicates the importance of maintaining the enterohepatic circulation of bile salts during the biliary excretion phase of cholecystography with iopanoic acid.

3659 ERYTHRITOL AND MANNITOL CLEARANCES WITH TAUROCHOLATE AND SECRETIN-INDUCED CHOLERESES.

(Eng.) Barnhart, J. L.; Combes, B. (Univ. Texas Southwestern Medical Sch., Dallas, TX 75235). *Am. J. Physiol.* 234(2):E146-E156; 1978.

To determine whether erythritol and mannitol enter bile during secretin-induced choleresis, the biliary clearances of ^{14}C-erythritol (C_{ery}) and ^{3}H-mannitol (C_{mann}) were measured simultaneously in dogs during choleresis induced by sodium taurocholate and by secretin. C_{ery} increased equally with the increase in bile flow induced by taurocholate, whereas mannitol entry into bile was partially restricted; the change in $(\Delta)C_{ery}/\Delta$bile flow averaged 0.96; $\Delta C_{mann}/\Delta C_{ery}$ averaged 0.81. Values for erythritol clearance exceeded bile flow by a constant volume over a wide range of bile flow readings, which suggests distal reabsorption of a fixed amount of fluid, independent of canalicular bile production. During secretin-induced choleresis, both C_{ery} and C_{mann} accompanied 30-40% of the increase in bile flow, and the C_{mann}/C_{ery} ratio was 1.02. Thus, the secretin-responsive region is permeable to both erythritol and mannitol. This fact affects the extent to which measured erythritol clearance accurately reflects canalicular bile formation; C_{ery} may underestimate or overestimate canalicular bile flow. The electrolyte composition of bile remained relatively constant over a broad range of bile flow samplings although the characteristics of taurocholate- and secretin-induced biles differed from each other.

Taurocholate-stimulated bile was virtually isotonic. Secretin-induced bile had a high total concentration of electrolyte (mean concentration 367 mEq/l) rich in chloride and bicarbonate and was hypertonic.

3660 EFFECT OF BILIARY OBSTRUCTION ON 26-HYDROXYLATION OF C_{27}-STEROIDS IN BILE ACID SYNTHESIS. (Eng.) Gustafsson, J. (Karolinska Institutet, Stockholm, Sweden). *J. Lipid Res.* 19 (2):237-243; 1978.

The effect of biliary obstruction on side chain hydroxylations in the biosynthesis and metabolism of bile acids was studied in male Sprague-Dawley rats. For comparison, several other hydroxylation reactions in bile acid biosynthesis and metabolism were assayed. Biliary obstruction inhibited microsomal 26-hydroxylation of 5β-cholestane-3α,7α-diol and microsomal 25- and 26-hydroxylation of 5β-cholestane-3α,7α,12α-triol. Microsomal 7α-hydroxylation of cholesterol and 6β-hydroxylation of lithocholic acid increased markedly, whereas the increase in microsomal 12α-hydroxylation of 5β-cholestane-3α,7α-diol was less. Mitochondrial 26-hydroxylation of cholesterol, 5-cholestene-3β,7α-diol, and 7α-hydroxy-4-cholesten-3-one was stimulated, whereas 26-hydroxylation of 5β-cholestane-3α,7α-diol was not affected and that of 5β-cholestane-3α,7α,12α-triol was markedly inhibited. The results indicate that mitochondrial 26-hydroxylation, particularly of substrates that are primarily precursors of chenodeoxycholic acid, plays a more important role in bile acid biosynthesis under conditions of biliary obstruction than under normal conditions.

3661 OCCURRENCE OF SULFATED 5α-CHOLANOATES IN RAT BILE. (Eng.) Eriksson, H.; Taylor, W.; Sjovall, J. (Karolinska Inst., Stockholm, Sweden). *J. Lipid Res.* 19(2):177-186; 1978.

Bile acids in bile from male and female Sprague-Dawley rats with cannulated bile ducts were analyzed by repetitive scanning gas-liquid chromatography-mass spectrometry after initial fractionation of conjugate classes on diethylaminohydroxypropyl Sephadex LH-20. The proportion of total bile acids excreted as sulfates was higher in female (0.9-1.3%) than in male (0.1-0.2%) rats. Most of the sulfated bile acids had a 5α-configuration, allochenodeoxycholic acid being the major compound in bile from female rats. This bile acid was also present in the nonsulfate fraction but could not be found in bile from male rats. The results indicate that gas-liquid chromatography-mass spectrometry must be used to provide sufficient specificity in bile acid analyses. Thus, compounds from the sulfate fraction having the retention times of cholic and chenodeoxycholic acid derivatives are found to be due to derivatives of the 3β,5α-isomers of these bile acids.

3662 SUITABILITY OF [11,12-$^{3}H_{2}$]CHENODEOXYCHOLIC ACID AND [11,12-$^{3}H_{2}$]LITHOCHOLIC ACID FOR ISOTOPE DILUTION STUDIES OF BILE ACID METABOLISM IN MAN. (Eng.) Ng, P. Y.; Allan, R. N.; Hofmann, A. F. (Mayo Foundation and Medical Sch., Rochester, MN 55901). *J. Lipid Res.* 18(6):753-758; 1977.

The stability of the label in [11,12-$^{3}H_{2}$]chenodeoxycholic acid and [11,12-$^{3}H_{2}$]lithocholic acid during enterohepatic cycling was assessed to define the suitability of these tracers for isotope dilution studies of bile acids in man. [11,12-$^{3}H_{2}$]chenodeoxycholic acid (60 μCi) and [24-^{14}C]chenodeoxycholic acid (20 μCi) were administered simultaneously to six healthy adults. The $^{3}H/^{14}C$ ratio of biliary chenodeoxycholic acid and the specific activity of biliary chenodeoxycholic acid were determined to permit calculation of pool size and turnover rate. Urinary label excretion was measured as well as the $^{3}H/^{14}C$ ratio of fecal bile acids. Similar studies were carried out with [11,12-$^{3}H_{2}$]lithocholic acid and [24-^{14}C]lithocholic acid. With [11,12-$^{3}H_{2}$]chenodeoxycholic acid, 10-15% of the label was lost during the first 24 hr, after which the $^{3}H/^{14}C$ ratio of biliary chenodeoxycholic acid remained constant. The loss of ^{3}H caused a consistent overestimate of pool size by 10-15%, but since the fractional turnover rate of the two isotopes was identical, the calculated rate of synthesis was 10-15% greater when determined using ^{3}H. The loss of ^{3}H was attributed to the presence of ^{3}H in positions other than 11 and 12 occurring during the labeling procedure when the unsaturated precursor was exposed to carrier-free tritium gas. The $^{3}H/^{14}C$ ratio of feces was consistently below that of bile, suggesting bacterial removal of additional ^{3}H during distal intestinal passage. In contrast, [11,12-$^{3}H_{2}$]-lithocholic acid lost ^{3}H continuously, so that by 2 days after administration, the $^{3}H/^{14}C$ ratio had fallen to nearly half of that of the administered mixture. It is concluded that isotope dilution studies may be carried out with one preparation of [11,12-$^{3}H_{2}$]chenodeoxycholic acid with an error of 10-15%; possibly a more stable preparation can be made with a gentler tritiation procedure. One preparation of [11,12-$^{3}H_{2}$]lithocholic acid was unsatisfactory for isotope dilution studies in man.

3663 COMPARATIVE EFFECTS OF URSODEOXYCHOLIC ACID AND CHENODEOXYCHOLIC ACID IN THE RHESUS MONKEY: BIOCHEMICAL AND ULTRASTRUCTURAL STUDIES. (Eng.) Fedorowski, T.; Salen, G.; Zaki, F. G.; Shefer, S.; Mosbach, E. H. (Veterans Admin. Hosp., East Orange, NJ 07019). *Gastroenterology* 74(1):75-80; 1978.

To investigate the effects of bile acid feeding on hepatic function, rhesus monkeys were treated with 40 and 100 mg/kg/day of ursodeoxycholic acid (UDCA, 3α,7β-dihydroxycholanoic acid) and chenodeoxycholic acid (CDCA, 3α,7α-dihydroxycholanoic acid), resp. Serum liver enzyme levels were measured at the start of the studies, at monthly intervals thereafter, and terminally. After 6 months, all animals were killed, and the hepatic morphology was examined by light and electron microscopy; biliary bile acid composition and fecal bile composition were determined by gas-liquid chromatography. Liver damage developed in the CDCA-treated animals and consisted of bile duct proliferation, periportal inflammation, fibrosis, and disruption of bile canaliculi, and was associated with a 4- to 10-fold rise in serum transaminase and leucine aminopeptidase levels. Biliary lithocholic acid rose to 10% of the total biliary bile acids in the CDCA-treated animals. In contrast, liver morphology and liver function tests (SGOT, SGPT, and leucine aminopeptidase) were not affected by either 40 or 100 mg/kg/day of UDCA; biliary lithocholic acid concentrations did not change appreciably. Hepatic β-hydroxy-β-methylglutaryl coenzyme A reductase activity (reflecting cholesterogenesis) was suppressed equally (30%) by UDCA and CDCA, but serum cholesterol levels did not change. These findings confirm that CDCA is associated with serious liver damage that probably results from increased formation of lithocholic acid. In contrast, UDCA caused no liver toxicity and no rise in lithocholic acid. Thus, the 7β-hydroxy group of UDCA was apparently degraded differently than the 7α-hydroxy group of CDCA, suggesting that intestinal bacterial dehydroxylases are stereospecific. Because of different bacterial degradation, gallstone treatment with UDCA may be safer and more economical.

3664 STIMULATION OF THYMIDINE INCORPORATION IN MOUSE LIVER AND BILIARY TRACT EPITHELIUM BY LITHOCHOLATE AND DEOXYCHOLATE. (Eng.) Bagheri, S. A.; Bolt, M. G.; Boyer, J. L.; Palmer, R. H. (Franklin McLean Memorial Res. Inst., Univ. Chicago, Chicago, IL). *Gastroenterology* 74(2, Part 1):188-192; 1978.

The early effects of lithocholate and related bile salts on the liver and biliary tract were investigated in female mice by measuring tritiated thymidine (^{3}HTdR) incorporation into DNA after single p.o. doses of bile salts. Lithocholate (≥12.5 mg) enhanced incorporation of ^{3}HTdR at 28 and 36 hr in gallbladder epithelium and at 36 hr in hepatocytes. Areas of hepatocellular necrosis, resembling the lesions of peliosis hepatis, occurred with 12.5- and 25-mg doses of lithocholate, but were not seen with deoxycholate, cholate, chenodeoxycholate, ursodeoxycholate, or hyodeoxycholate. Deoxycholate, and to a lesser extent cholate, also stimulated ^{3}HTdR incorporation in both liver and gallbladder, but chenodeoxycholate did not. These studies suggest that certain bile acids rapidly exert major effects on cell kinetics in the liver and biliary tract, and that these effects depend on the structure of the bile acid molecule. Bile duct (organ) hyperplasia induced by lithocholate must depend on additional factors. The stimulation of proliferative activity by certain (particularly secondary) bile acids may have important consequences for tissues and organs exposed to the bile acid pool during its enterohepatic circulation and subsequent excretion via the colon.

3665 METABOLISM OF URSODEOXYCHOLIC ACID IN MAN. (Eng.) Fedorowski, T.; Salen, G.; Colallilo, A.; Tint, G. S.; Mosbach, E. H.; Hall, J. C. (Veterans Admin. Hosp., East Orange, NJ 07019). *Gastroenterology* 73(5):1131-1137; 1977.

Ursodeoxycholic acid metabolism was investigated in seven subjects during treatment with ursodeoxycholic acid (1 g/day) and chenodeoxycholic acid (1 g/day) for 2 weeks. The molar proportions of biliary cholesterol, lecithin, and bile salts were determined before and during bile acid treatment, and the pool sizes and daily turnover of ursodeoxycholic acid were measured by isotope dilution techniques after the administration of [24-^{14}C]ursodeoxycholic acid. Ursodeoxycholic acid became the major biliary bile acid (56%) during ursodeoxycholic acid treatment, while the proportion of chenodeoxycholic acid declined from 32% to 18% and of cholic acid from 38% to 17%. Deoxycholic acid and lithocholic acid were virtually absent from the bile. During chenodeoxycholic acid administration, chenodeoxycholic acid became the major biliary bile acid (59%), cholic acid declined to 22% of the biliary bile acids, and the proportion of lithocholic acid rose from 1.3% to 3.4%, and an additional 4% were sulfated. Ursodeoxycholic acid increased to 8% of the total bile acids. The molar percentage of biliary cholesterol decreased from 8% to 5% during both ursodeoxycholic acid and chenodeoxycholic acid administration. After [24-^{14}C]ursodeoxycholic acid was administered i.v., the biliary specific activity time curves of ursodeoxycholic acid decayed exponentially during both bile acid treatment periods. In the ursodeoxycholic acid-treated subjects, the ursodeoxycholic acid decay curve intersected with the rising specific activity curve of chenodeoxycholic acid and revealed a precursor-product relationship. The average ursodeoxycholic acid pool measured 938 ± 458 mg with a daily production rate of 900 ± 438 mg/day (absorption). The average ursodeoxycholic acid pool during chenodeoxycholic acid treatment measured 123 ± 82 mg, and the production rate was 91 ± 35 mg/day (synthesis). These studies demonstrate that substantial quantities of ursodeoxycholic acid are absorbed when this bile acid is fed or are synthesized when chenodeoxycholic acid is given. The reduction in bile lithogenicity during ursodeoxycholic acid administration implies that this bile acid, like chenodeoxycholic acid, may be effective in dissolving cholesterol gallstones in man.

3666 HEPATIC ACCUMULATION AND INTRACELLULAR BINDING OF CONJUGATED BILIRUBIN. (Eng.) Wolkoff, A. W.; Ketley, J. N.; Waggoner, J. G.; Berk, P. D.; Jakoby, W. B. (Albert Einstein Coll. Medicine, Bronx, NY). *J. Clin. Invest.* 61(1):142-149; 1978.

Hepatic accumulation and intracellular binding of conjugated bilirubin were studied in Sprague-Dawley and Wistar R rats. After the i.v. injection of unconjugated ^{3}H-bilirubin into normal rats, radiolabeled bile pigments rapidly accumulated in the liver. By 1.5 min after injection, an average of 36% of the injected isotope was present in liver homogenates. Between 3 and 15 min, 37-64% of the total intrahepatic radiolabeled bilirubin was conjugated, as demonstrated by extraction of label into the polar phase of a solvent partition system. This indicates both rapid conjugation and accumulation of conjugated bilirubin within the liver cell. Fluorometric determination of the dissociation constants of purified bilirubin and its mono- and di-glucuronides for homogeneous preparations of two human and four rat glutathione S-transferases, including ligandin, revealed avid binding of all three bile pigments to this class of proteins. Hence, the observation that the intrahepatic bile pigment pool contains substantial amounts of conjugated bilirubin can be attributed to the high binding affinities observed. Thin-layer chromatographic analysis of the ^{3}H-pigments produced by *p*-iodoaniline diazotization of homogenates and cytosol demonstrated that the intrahepatic pool of conjugated bilirubin was almost exclusively monoglucuronide. Examination of radiolabeled bilirubin conjugates excreted in bile during the first 20 min after injection of ^{3}H-bilirubin showed no preferential excretion of diglucuronide. These studies indicate that both bilirubin and its monoglucuronide accumulate within the liver cell as ligands with the glutathione S-transferase and that bilirubin diglucuronide does not significantly accumulate within the general intrahepatocellular pool of protein-bound bile pigments. The latter observation is compatible with the formation and excretion of bilirubin diglucuronide directly from the canalicular pool of the liver cell.

3667 CHOLESTEROL GALLSTONES AND BILIARY LIPID METABOLISM IN THE PRIMATE. (Eng.) Redinger, R. N.; Grace, D. M. (Univ. Hosp., Univ. Western Ontario, London, Ontario N6A 5A5, Canada). *Gastroenterology* 74(2, Part 1):201-204; 1978.

A primate model for the study of cholesterol gallstones is described. Bile became supersaturated with cholesterol in seven female adult baboons with exteriorized enterohepatic circulations during cholestyramine treatment (0.2 g/kg/day, intraduodenally). Cholestyramine decreased bile acid pool size (1.38 ± 0.7 to 0.45 ± 0.02 mmol, $p<0.001$) and secretion rate (12.7 ± 0.9 to 5.6 ± 0.5 mmol/24 hr), while cholesterol secretion remained unaltered. Although biliary lipid and bile acid composition were similarly affected by treatment in both cholecystectomized and intact animals, cholesterol stones formed only in the latter. Thus metabolic alterations in biliary lipid metabolism as well as the presence of the gallbladder were necessary for stone formation.

3668 EVIDENCE FOR A COMMON HEPATIC CHOLESTEROL PRECURSOR SITE FOR CHOLIC AND CHENODEOXYCHOLIC ACID SYNTHESIS IN MAN. (Eng.) Schwartz, C. C.; Vlahcevic, Z. R.; Halloran, L. G.; Nisman, R.; Swell, L. (Veterans Admin. Hosp., Richmond, VA 23249). *Proc. Soc. Exp. Biol. Med.* 156(2):261-264; 1977.

The question of whether cholic and chenodeoxycholic acids arise from a specific cholesterol precursor site in man was investigated in patients with bile fistulae. The patients received ^{14}C-cholesterol and labeled mevalonic acid by constant infusion (for 5 hr) or by i.v. pulse. Bile was collected at 20- to 60-min intervals for 4 hr following the administration of the labeled compounds, and then at longer intervals up to 24 hr. The specific activities of newly synthesized cholic and chenodeoxycholic acids were virtually identical at all time periods. These observations provide evidence for the presence of a common cholesterol substrate pool for primary bile acid synthesis in man. Both cholic and chenodeoxycholic acids appear to be synthesized via the 7α-hydroxycholesterol pathway.

3669 DYNAMICS OF CHOLESTEROL GALLSTONE DISSOLUTION IN CANINE BILE. (Eng.) Thurston, O. G. (Dept. Surgery, Univ. Alberta, Edmonton, Alberta, Canada). *J. Surg. Res.* 24(1):15-19; 1978.

Studies on the dynamics of cholesterol gallstone dissolution in canine bile were carried out using human gallstones. Two cholesterol gallstones, matched for size and gross morphology, were obtained from each of seven patients undergoing cholecystectomy. The cholesterol content of one stone was determined. The second stone was dried, weighed, and measured, and its surface area was calculated. The second stone was then implanted singly into a dog's gallbladder for 21-24 days. The rate of stone dissolution, the effects of stone size and cholesterol content on dissolution rate, and the effect of dissolution on biliary lipids were studied. The rate of stone dissolution varied from 6.9 to 37.9 μg/day/mm^2 and was dependent upon initial surface area of the stone and, to a lesser extent, on cholesterol content of the matched stone. The rate of dissolution declined with the largest stones, suggesting that bile displacement from the gallbladder was a factor. The molar percentage of cholesterol in gallbladder bile increased during the period of dissolution, indicating that gallstones themselves may influence biliary lipid composition.

3670 THE RELATIONSHIP OF CHOLECYSTECTOMY AND TAUROCHOLIC ACID FEEDING TO BILE COMPOSITION AND HEPATOCYTE FUNCTION IN PRAIRIE DOGS. (Eng.) Gardner, B.; Chenouda, M.; Dennis, C.; Patti, J. (Downstate Medical Center, State Univ. New York, 450 Clarkson Ave., Brooklyn, NY 11203). *Am. J. Surg.* 135(1):40-47; 1978.

The prairie dog was used as a model for human gallstone formation. Serum cholesterol was measured at intervals in animals on the lithogenic diet for a period up to 1 yr. Bile collections were made over 24 hr at 1-hr intervals up to 10 hr, and then the remaining 14-hr collection was pooled. Stones formed in the gallbladder of all animals on a lithogenic diet. Hepatic bile was nonlithogenic, whereas gallbladder bile promoted cholesterol precipitation. The addition of taurocholate (2 g/100 ml, 3-4 months) to the lithogenic diet reduced the number of stones and lithogenicity. Cholecystectomy resulted in an increased bile flow and reduced secretion of cholesterol in the animals on a high cholesterol diet. Reduction of cholesterol and bile acid synthesis by negative feedback was demonstrated in isolated hepatocyte culture. The shift of bile salt production to chenodeoxycholates on a high cholesterol intake was demonstrated both *in vivo* and *in vitro*. A theory of gallstone formation is presented that hypothesizes a defect in hepatocyte storage of cholesterol rather than bile acid synthesis as the primary effect, relegating the problem to one of a disease of lipid metabolism.

3671 EFFECT OF AUTOCLAVING OF A LACTOSE-CONTAINING DIET ON CHOLESTEROL AND BILE ACID METABOLISM OF CONVENTIONAL AND GERM-FREE RATS. (Eng.) Wostmann, B. S.; Beaver, M.; Chang, L.; Madsen, D. (Dept. Microbiology, Univ. Notre Dame, Notre Dame, IN 46556). *Am. J. Clin. Nutr.* 30(2): 1999-2005; 1977.

Studies were carried out in conventional and germ-free male Lobund-Wistar rats to determine whether lactose fed at levels usually consumed by the adult population of developed countries could influence cholesterol and bile acid metabolism to a major extent. Feeding lactose in amounts comparable to the adult human intake (6% of diet, and in later studies 10%) had no major effect on the cholesterol and bile acid metabolism of germ-free and conventional rats. However, when lactose-containing casein-starch diets were sterilized by autoclaving, changes in intestinal and/or fecal bile acids were found. Both germ-free and conventional rats demonstrated some increase in intestinal β-muricholic acid concentrations ascribable to the mere presence of lactose in the diet. Autoclaving the diet produced additional changes, especially in the fecal bile acid pattern of conventional rats; the ratio between the β-muricholic-derived secondary bile acids hyodeoxycholic and ω-muricholic acids changed from the usual 5:3 to approximately 1:10, with ω-muricholic acid becoming the major fecal bile acid. These changes point to a notable effect of lactose-derived products, formed during steam sterilization, on the microbial modification of intestinal bile acids in the lower gut.

3672 THE EFFECT OF CALCIUM ON THE OXIDATION OF ACETALDEHYDE BY RAT LIVER MITOCHONDRIA. (Eng.) Cederbaum, A. I. (Mount Sinai Sch. Medicine of the City Univ. New York, New York, NY 10029). *Life Sci.* 22(1):111-125; 1978.

The influence of Ca^{2+} and the cationic environment on the oxidation of acetaldehyde by liver isolated rat mitochondria was studied. Oxidation of acetaldehyde proceeded at different rates under three different conditions: state 4<state 3<valinomycin. Ca^{2+} (>0.10 mM) inhibited the oxidation of acetaldehyde by the isolated mitochondria under all conditions. Valinomycin-stimulated oxidation of acetaldehyde was more sensitive to inhibition by Ca^{2+} than were the state 3 or 4 rates of acetaldehyde oxidation. Acetaldehyde could support an energy-dependent uptake of Ca^{2+} at rates about 20% of that found with succinate. Ruthenium red almost completely prevented the inhibition by Ca^{2+} under all conditions. The addition of externally added NAD^{+} or NADH provided complete relief against the inhibitions by Ca^{2+} of the state 4 and 3 rates of acetaldehyde oxidation. Although some relief was also observed with the valinomycin-stimulated system, significant inhibition persisted. Cations such as Zn^{2+}, Cu^{2+}, or Hg^{2+} also inhibited acetaldehyde oxidation, whereas Mg^{2+} and Mn^{2+} were without effect. These cations also blocked glutamate oxidation, and presumably inhibit acetaldehyde oxidation by preventing reoxidation of NADH. The greater sensitivity of the ionophore-stimulated oxidation of acetaldehyde to inhibition by Ca^{2+} may reflect release of intramitochondrial K^{+}, which is known to occur in the presence of Ca^{2+}, suggesting that acetaldehyde oxidation is influenced by the cation environment within the mitochondria.

3673 EVIDENCE THAT ACETALDEHYDE IRREVERSIBLY IMPAIRS GLYCOPROTEIN METABOLISM IN LIVER SLICES. (Eng.) Sorrell, M. F.; Tuma, D. J.; Barak, A. J. (Veterans Admin. Hosp., 4101 Woolworth Ave., Omaha, NB 68105). *Gastroenterology* 73(5):1138-1141; 1977.

The reversibility of acetaldehyde inhibition of glycoprotein synthesis was investigated in Sprague-Dawley rat liver. When liver slices were incubated for 1 hr in a medium containing either 5 mM acetaldehyde or ethanol and then switched to a fresh medium free from acetaldehyde but containing the appropriate radioactive precursors and reincubated for an additional 3 hr, a decreased incorporation of both [^{14}C]glucosamine and [^{14}C]leucine into hepatocellular and secretory proteins was observed. Further studies were carried out comparing the inhibitory effects of ethanol and acetaldehyde on drug metabolism. Higher concentrations of ethanol were necessary to impair aniline hydroxylation when compared to its effect on glycoprotein metabolism. Acetaldehyde did not affect aniline metabolism, suggesting some specificity for its effect on intracellular metabolic functions. These results show that the acetaldehyde-induced inhibition of glycoprotein synthesis is irreversible under these short-term experimental conditions and is not dependent on the physical presence of acetaldehyde in the incubation medium.

3674 THE EFFECTS OF FRUCTOSE AND OTHER SUBSTANCES ON ACETALDEHYDE AND ETHANOL METABOLISM IN THE RAT. (Eng.) Rawat, A. K. (Medical Coll. Ohio, Toledo, OH 43699). *Res. Commun. Chem. Pathol. Pharmacol.* 18(4):665-676; 1977.

The comparative effectiveness of fructose, glucose, sucrose, and alanine in increasing the rates of ethanol and acetaldehyde clearance was tested in male rats. The administration of fructose i.v. was found to be the most effective, followed by alanine, in increasing the rate of blood alcohol clearance; clearance was increased from 55.7 ± 4 μmol/ml/hr to 132.5 ± 14 µmol/ml/hr with fructose and to 120.0 ± 11 µmol/ml/hr with alanine. The administration of any one of the test substances during ethanol metabolism did not result in a significant change in the levels of blood acetaldehyde. Fructose partially prevented the ethanol-mediated changes in the concentration ratios of lactate/pyruvate and β-hydroxybutyrate/acetoacetate. Its administration also resulted in the reversal of acetaldehyde-mediated changes in the liver. The administration of all test substances resulted in an increase in hepatic glucose levels; however, a combination of these substances with ethanol resulted in decreased hepatic glucose levels. The most pronounced effect on glucose was observed when ethanol was given in combination with glucose. During the simultaneous metabolism of fructose and ethanol, hepatic and blood levels of sorbitol increased markedly. Fructose also exerted the most pronounced antiketogenic action. The increased rates of blood alcohol clearance induced by fructose and alanine are exerted at the hepatic level by producing a more oxidized state of the liver; these observations are of special interest in view of the recent trend toward employing fructose for the treatment of acute ethanol intoxication.

3675 COMMON MECHANISM FOR THE ADAPTIVE INCREASE IN HEPATIC ETHANOL AND ACETALDEHYDE METABOLISM DUE TO CHRONIC PRETREATMENT WITH ETHANOL.

(Eng.) Thurman, R. G.; Brentzel, H. J.; McKenna, W. R. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA 19174). *Adv. Exp. Med. Biol.* 85A:237-245; 1977.

The effect of chronic ethanol pretreatment on acetaldehyde metabolism was investigated in the perfused rat liver, and evidence that supports the involvement of reoxidation of NADH in stimulating ethanol oxidation in ethanol-treated animals is reviewed. Livers from rats pretreated with ethanol for 3-5 weeks utilized ethanol and acetaldehyde at higher rates than did appropriate controls. This adaptive increase in hepatic ethanol and acetaldehyde uptake was associated with marked (>60%) increase in hepatic oxygen uptake. Ethanol uptake in both ethanol-treated and control livers was similarly sensitive to inhibition by 4-methylpyrazole, rotenone, and antimycin A. The adaptive increase in ethanol uptake was apparently specifically abolished by ouabain. These data are consistent with the hypothesis that chronic treatment with ethanol increases ATPase activity. The ADP produced from these initiating events enters the mitochondrial space and stimulates electron transport and oxygen uptake. As a consequence of these events, a greater rate of NADH reoxidation occurs, resulting in a greater rate of production of NAD$^+$, which stimulates ethanol oxidation via alcohol dehydrogenase and acetaldehyde oxidation via aldehyde dehydrogenase(s).

3676 ETHANOL OXIDATION BY ISOLATED HEPATOCYTES FROM ETHANOL-TREATED AND CONTROL RATS: FACTORS CONTRIBUTING TO THE METABOLIC ADAPTATION AFTER CHRONIC ETHANOL CONSUMPTION.

(Eng.) Cederbaum, A. I.; Dicker, E.; Lieber, C. S.; Rubin, E. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Biochem. Pharmacol.* 27(1): 7-15; 1978.

Various aspects of ethanol oxidation were studied in hepatocytes isolated from rats chronically fed ethanol and from controls to investigate factors contributing to metabolic adaptation after chronic ethanol consumption. Chronic ethanol consumption (36% of total calories for 4 weeks) by rats produced a fatty liver and resulted in a pronounced increase in the rate of ethanol oxidation by isolated hepatocytes. Despite the increase in ethanol oxidation, oxygen consumption with several substrates was not enhanced after chronic ethanol treatment. Ouabain did not abolish the increase in the rate of ethanol oxidation. About 40-50% of the increase in ethanol oxidation persisted after inhibition of alcohol dehydrogenase, mitochondrial oxygen consumption, or the malate-aspartate shuttle. The addition of substrates for the malate-aspartate shuttle slightly increased the rate of ethanol oxidation in hepatocytes from control and ethanol-treated animals. The increased rate of ethanol oxidation was not abolished by the uncoupling agent dinitrophenol, which by itself had little effect on ethanol oxidation. In the presence of aspartate or α-glycerophosphate, dinitrophenol augmented the rate of ethanol oxidation; in the presence of glutamate, the rate of ethanol oxidation was doubled by dinitrophenol. However, the higher rate of ethanol oxidation after ethanol consumption was still found in the presence of various combinations of substrate shuttles, with or without dinitrophenol. Pathways independent of alcohol dehydrogenase may contribute, at least in part, to the increase in ethanol oxidation found after chronic ethanol consumption. It is concluded that ethanol oxidation may be enhanced after chronic ethanol consumption without the establishment of a hypermetabolic state of the liver.

3677 DIFFERENTIAL EFFECT OF ETHANOL INGESTION ON THE PROTEIN SYNTHETIC ACTIVITIES OF FREE AND MEMBRANE-BOUND RIBOSOMES FROM LIVER OF THE WEANLING RAT.

(Eng.) Khawaja, J. A.; Lindholm, D. B. (Dept. Medical Chemistry, Univ. Helsinki, Siltavuorenpenger 10 A, SF-00170 Helsinki 17, Finland). *Res. Commun. Chem. Pathol. Pharmacol.* 19(1): 129-139; 1978.

The influence of chronic ethanol ingestion on the protein synthetic activities of free and membrane-bound ribosomes was studied *in vitro* in the liver of 25-day-old male Sprague-Dawley rats. Ethanol administration (6.3% volume/volume of diet for 13 days) caused about 120% increase in the incorporation of amino acids by free ribosomes. In contrast, membrane-bound ribosomes from the livers of ethanol-fed animals exhibited a 25% decline in their protein synthetic activity. This decline in the activity of membrane-bound ribosomes was abolished after dissolution of membranes by Triton X-100. The observed alterations in protein synthesis due to ethanol intake may be the result of changes in the pH 5 enzyme fraction, an altered amount of ribosome-associated messenger RNA, and damage to the endoplasmic reticulum.

3678 KINETICS OF ETHANOL INHIBITION OF GALACTOSE ELIMINATION IN PERFUSED PIG LIVER.

(Eng.) Keiding, S.; Johansen, S.; Tonnesen, K. (Rigshospitalet, DK-2100 Copenhagen, Denmark). *Scand. J. Clin. Lab. Invest.* 37(6):487-494; 1977.

The effect of ethanol (5-25 mM) on galactose elimination kinetics in the intact liver was studied in the isolated perfused pig liver, using the steady-state infusion technique. Ethanol reduced galactose V_{max} in six experiments to 0.07 mmol/min/kg liver (average) from 0.43 mmol/min/kg obtained in control experiments without ethanol. Also, K_m was significantly reduced from 0.23 mM plasma water to 0.03 mM. Ethanol increased uridine diphosphate (UDP)-galactose 10-fold simultaneous with a rise in the hepatic outflow ratio of lactate to pyruvate to about 300 from 10; this finding indicates that ethanol inhibits epimerase activity. In experiments with increasing galactose elimination rates, the galactose-1-P concentration increased much less than the concentration of galactose, and the phosphorylation of galactose therefore seems to be rate-limiting. *In vitro*, galactokinase activity is inhibited by galactose-1-P. In the present study, ethanol increased galactose-1-P 5-10 times, and the reduction of V_{max} and K_m by ethanol could be explained by uncompetitive inhibition by galactose-1-P with K_i about 0.1 mM. Ethanol decreased UDP-glucose to about 40% and uridine triphosphate to less than 5% probably due to trapping as UDP-galactose. This trapping may depress the forward transferase reaction, and therefore the other cosubstrate galactose-1-P rises and inhibits galactokinase activity.

3679 ETHANOL-INDUCED HYPOGLYCAEMIA IN MAN: ITS SUPPRESSION BY THE ALCOHOL DEHYDROGENASE INHIBITOR 4-METHYLPYRAZOLE.

(Eng.) Salaspuro, M. P.; Pikkarainen, P.; Lindros, K. (Univ. Central Hosp. Helsinki, SF-00290 Helsinki 29, Finland). *Eur. J. Clin. Invest.* 7(6):487-490; 1977.

To examine whether alcohol hypoglycemia can be prevented by 4-methylpyrazole (4-MP) in humans and how this inhibition is related to changes in the redox state of the NAD/NADH couple, the redox state, which reflects the metabolites lactate, pyruvate, 3-hydroxybutyrate, and acetoacetate, was determined from venous blood in 10 healthy subjects. The rate of ethanol elimination and blood concentrations of acetaldehyde were also determined. The infusion of ethanol (0.6 g/kg) caused marked hypoglycemia in subjects fasted for 36 hr. Previous administration of the alcohol dehydrogenase (ADH) inhibitor 4-MP (7 mg/kg, i.v.) strongly suppressed the ethanol-induced hypoglycemia. The rate of ethanol elimination was 84.6 mg/kg/hr. 4-MP caused a 21% reduction of ethanol elimination but had no significant effect on blood acetaldehyde levels. 4-MP also significantly suppressed the ethanol-induced elevation of blood lactate and almost completely prevented the increase in the 3-hydroxybutyrate/acetoacetate ratio, but had only a slight effect on the lactate/pyruvate ratio of venous blood. The results demonstrate that the hypoglycemia and lactacidemia produced by alcohol oxidation can be prevented by a dose of 4-MP that diminishes or prevents the ethanol-induced shift in the NAD-coupled redox state of the liver.

3680 EFFECT OF AMP ON ACUTE CARBON-TETRACHLORIDE HEPATOTOXICITY.

(Eng.) Mikhail, T. H.; Awadallah, R.; Dessoukey, E. A. (Natl. Res. Centre, Dokki, Cairo, Egypt). *Z. Ernaehrungswiss.* 16(4):256-261; 1977.

The protective effect of AMP on carbon tetrachloride (CCl_4) hepatotoxicity was studied in adult albino rats. Rats injected i.p. with 0.5 ml of a CCl_4-mineral oil mixture (1:1 by volume) per 100 g body weight showed significant ($p<0.05$) increases in SGOT (107.4 ± 12.9 versus 69.3 ± 13.0 IU/l for controls), SGPT (152.3 ± 17.7 versus 27.8 ± 7.9 IU/l for controls), alkaline phosphatase (38.9 ± 4.2 versus 16.8 ± 2.9 King-Armstrong U for controls), and total liver lipids (10.99 ± 1.42 versus 4.67 ± .82 g% for controls) and a significant ($p<0.05$) decrease in the albumin/total globulin ratio (0.46 ± .03 versus 0.73 ± .08 for controls). The i.p. administration of 30 mg/rat of AMP 30 min before CCl_4 treatment afforded protection against CCl_4 hepatotoxicity as judged by significantly ($p<0.05$) decreased levels of SGOT (91.2 ± 1.0 IU/l), SGPT (86.0 ± 16.9 IU/l), alkaline phosphatase (19.9 ± 5.7 King-Armstrong U), and total liver lipids (7.80 ± 0.73 g%) and a significantly ($p<0.05$) increased albumin/total globulin ratio (0.59 ± .08). The administration of AMP had no effect on serum total protein. Acute CCl_4 hepatotoxicity produces fatty liver associated with elevations in certain serum enzyme levels and a decrease in the albumin/total globulin ratio. Prior treatment with AMP ameliorates liver function without the complete prevention of fatty liver.

3681 ACTIN-LIKE CONTRACTILE PROTEIN IN CARBON TETRACHLORIDE-INDUCED CIRRHOSIS IN THE RAT.

(Eng.) Toh, B. H.; Cauchi, M. N.; Muller, H. K. (Monash Univ. Medical Sch., Praharan, Victoria 3181, Australia). *Pathology* 9(3):187-194; 1977.

The reactivity of cirrhotic livers with smooth muscle antibody (SMA) was examined, since, in cirrhosis, there is proliferation of hepatocytes and granulation tissue formation with subsequent liver shrinkage. Cryostat sections of livers from rats treated with carbon tetrachloride for 12 weeks were examined by indirect immunofluorescence for reactivity with human serum containing SMA. Increased binding of SMA serum to hepatocytes was observed as early as the first week of CCl_4 treatment and remained enhanced during the 12 weeks of study. No difference in staining intensity was observed between precirrhotic liver parenchymal cells and hepatocytes in regenerative nodules of frankly cirrhotic livers. In addition, granulation tissue fibroblasts in cirrhotic livers showed strong reactivity with SMA serum. The specificity of the staining reaction for actin was established by its prevention on neutralization absorptions of the serum with homogenates of smooth muscle or extracts containing actin derived from smooth muscle. Circulating SMA was not demonstrated in the serum of rats at any phase of the study. The observations show that there is an increased expression of actin-like protein in regenerating hepatocytes and granulation tissue fibroblasts in cirrhotic livers.

3682 CHOLESTATIC STEROID HORMONES INHIBIT TAUROCHOLATE UPTAKE INTO ISOLATED RAT HEPATOCYTES. (Eng.) Schwarz, L. R.; Schwenk, M.; Pfaff, E.; Greim, H. (GSF, Abteilung fur Toxikologie, Gebaude 43, 8042 Neuherberg, W. Germany). *Biochem. Pharmacol.* 26(24):2433-2437; 1977.

The effect of norethandrolone, 17-β-estradiol, and progesterone on hepatocellular uptake and secretion of taurocholate was studied in isolated rat liver cells. The three cholestatic steroids decreased the rate of taurocholate uptake. Norethandrolone inhibited uptake noncompetitively with an inhibition constant (K_i) of 18 μm, but had no effect on the activation energy of uptake. 17-β-Estradiol and progesterone reduced taurocholate uptake by 50% at concentrations between 40 μM and 50 μM. The secretion of taurocholate from taurocholate-loaded cells was slightly increased by all three steroids at concentrations below 100 μM. A 60% inhibition of secretion was observed in the presence of 500 μM norethandrolone. Interference of cholestatic steroids with hepatocellular bile acid uptake may be an important step in the pathogenesis of intrahepatic cholestasis.

3683 STORAGE OF PROTEINS IN THE ROUGH ENDOPLASMIC RETICULUM OF HUMAN HEPATOCYTES IN A PATIENT WITH NORMAL BLOOD PROTEINS, ON ORAL CONTRACEPTIVES. (Eng.) Porte, A.; Batzenschlager, A.; Stoeckel, M. E.; Bockel, R.; Girard, M.; Doffoel, M. (Institut de Physiologie, Strasbourg, France). *Virchows Arch.* [*Pathol. Anat.*] 375(3):241-248; 1977.

The case of a 28-yr-old woman presenting with jaundice and no evident abnormality in α_1-antitrypsin (AAT), in whom protein storage in the rough endoplasmic reticulum of the hepatocytes resembled those in AAT deficiency, is reported. The patient had been taking oral contraceptives for 4 yr. AAT and other blood protein levels were normal. Most hepatocytes contained characteristic globular inclusions, but they were PAS-negative and did not react with anti-AAT antibodies. This storage of protein ceased at the time the jaundice disappeared. Prolonged treatment with high doses of contraceptive steroids may have been involved in this peculiar reaction of the hepatocytes.

3684 MECHANISM OF ESTROGEN-INDUCED SATURATED BILE IN THE HAMSTER. (Eng.) Bonorris, G. G.; Coyne, M. J.; Chung, A.; Schoenfield, L. J. (Cedars-Sinai Medical Center, 8700 Beverly Blvd., Los Angeles, CA 90048). *J. Lab. Clin. Med.* 90(6):963-970; 1977.

The effect of ethinyl estradiol (EE) on the biliary saturation index (SI) and on the rate-limiting hepatic enzymes of cholesterol (CH) synthesis and of bile acid (BA) synthesis was studied in male hamsters. The animals received either a standard diet or a standard diet containing EE (50 μg/kg) for 1 month. Biliary lipids were determined at sacrifice. The activities of hepatic microsomal hydroxymethyl glutaryl coenzyme A reductase (HMG-CoAR) and 7α-hydroxylase were assayed. Biliary SI in EE-treated hamsters (1.12 ± 0.04) was significantly greater ($p<0.01$) than in the controls (0.68 ± 0.03). HMG-CoAR activity with EE treatment (299 ± 12.3 pmol/mg/min) was not different from control values (300 ± 9.5 pmol/mg/min). 7α-Hydroxylase activity was less ($p<0.01$) with EE treatment (14.7 ± 1.6 pmol/mg/min) than in the controls (23.0 ± 1.1 pmol/mg/min). EE treatment did not change the amount of esterified CH in total liver tissue from control level (3.92 ± 0.16 μmol/g) or in the microsomal fraction from control level (0.034 ± 0.003 μmol/mg). EE treatment did not change hepatic BA from control values (253 ± 10.4 nmol/g). These studies indicate that the increase in SI associated with EE treatment is associated with inhibition of BA synthesis without effect on CH synthesis. The absence of EE-induced changes in hepatic CH and BA concentrations suggests that this decreased BA synthesis may result from mechanisms other than altered substrate or increased BA feedback.

3685 EFFECT OF ESTRADIOL-17β ON THE METABOLISM OF BILE ACIDS IN THE RAT. (Eng.) Ayaki, Y. (Tottori Univ. Sch. Medicine, Yonago, Tottori 683, Japan). *J. Biochem.* 82(5):1379-1388; 1977.

The effect of estradiol-17β on bile acid metabolism was studied in male rats. A 3-day acute treatment with the hormone (100 μg/100 g, s.c.) caused a decrease in serum cholesterol (from 91.8 ± 7.2 mg/dl in controls to 40.3 ± 7.6 mg/dl) and an increase in hepatic cholesterol (from 1.68 ± 0.05 to 2.62 ± 0.14 mg/g). Chronic treatment with the same quantity twice a week for 3 weeks induced hypercholesteremia (from a control level of 85.3 ± 5.8 to a level of 123.5 ± 9.9 mg/dl), which continued for 10 days after the final dosage, but there was no change in total hepatic cholesterol. Fistula bile from both groups of treated rats collected during 30 min was analyzed for bile acid components. Hyodeoxycholic acid and/or chenodeoxycholic acid increased relative to cholic acid in both groups, as compared with the controls. Kinetic study of the metabolism of bile acids in the chronically treated rats revealed a more than twofold enlargement of the pool size but an almost unchanged half-life of chenodeoxycholic acid. Essentially no change in pool size or half-life was observed for cholic acid. These results indicate that chronic treatment of male rats with estradiol-17β causes an increase in elimination of hepatic cholesterol via the bile acid pathway.

3686 THE EFFECT OF ADMINISTRATION OF ETHINYL ESTRADIOL ON HEPATOCYTE MORPHOLOGY IN THE RHESUS MONKEY.

(Eng.) Wadsworth, P. F.; Kennedy, S. J.; Heywood, R. (Huntingdon Res. Center, Huntington PE18 6ES, England). *Toxicol. Lett.* 1(3): 169-174; 1977.

The effect of ethinyl estradiol administration on hepatic ultrastructure was studied in four female rhesus monkeys. The administration of ethinyl estradiol (100 μg/kg/day) for 26 weeks resulted in elevation of serum alanine aminotransferase (SALT) and serum leucine aminopeptidase values. Light microscopy showed no morphological change, but by transmission electron microscopy, hepatocytes containing needle-shaped electronlucent areas were identified in two of four treated animals, one of which had periportal hepatocytes with intracisternal sequestration of the endoplasmic reticulum. The changes in the hepatocytes were not considered to be sufficient to account for the increased SALT and LAP values. The needle-shaped electronlucent areas seen in the cytoplasm of the few hepatocytes in the two monkeys could possibly represent a cleft remaining after a crystal had been lysed out during processing.

3687 QUALITATIVE ALTERATION IN HEPATIC MICROSOMAL CYTOCHROME P-450 APOPROTEINS ASSOCIATED WITH BILE DUCT LIGATION, AND THE ADMINISTRATION OF ETHINYL ESTRADIOL, PHENOBARBITAL AND 3-METHYLCHOLANTHRENE.

(Eng.) Mackinnon, A. M.; Sutherland, E.; Simon, F. R. (Flinders Medical Center, Bedford Park, South Australia 5042, Australia). *Biochem. Pharmacol.* 27(1):29-35; 1978.

Studies were carried out in livers of Sprague-Dawley rats to investigate whether different forms of cytochrome P-450 are altered in hepatic disorders associated with impaired drug metabolism. Total hepatic cytochrome P-450 was decreased after either bile duct ligation or the administration of ethinyl estradiol (5 mg/kg/day, s.c., 5 days). In contrast, phenobarbital (80 mg/kg/day, i.p., 5 days) increased hepatic content of cytochrome P-450, and when administered with ethinyl estradiol the reduction in cytochrome P-450 was prevented. Microsomal ethylmorphine *N*-demethylase activities paralleled changes in cytochrome P-450 content, except in bile duct ligation, where the activity was diminished to a greater extent. Four forms of microsomal cytochrome P-450 apoproteins, ranging in molecular weight from 50,000 to 58,000 daltons, were tentatively identified in a sodium dodecyl sulfate (SDS)-6 M urea polyacrylamide gel electrophoresis system by their responsiveness to pharmacological agents, turnover, and benzidine peroxidase staining. Phenobarbital administration increased primarily band IV (50,000 daltons); in contrast, only band III (53,000 daltons) was responsive to 3-methylcholanthrene (10 mg/kg/day, i.p., 5 days). Bile duct ligation was associated with a marked reduction in bands I, III, and IV while bands I and III were decreased with ethinyl estradiol administration. Simultaneous administration of phenobarbital and ethinyl estradiol demonstrated a return of band I and an increase in density of bands II and IV. The mechanism of this reversal by phenobarbital was determined by the double-isotope technique, which demonstrated that phenobarbital increases the relative synthesis rates of P-450 apoproteins in ethinyl estradiol-treated rats. These studies support the hypothesis that multiple forms of cytochrome P-450 are present in liver microsomal membranes and that alterations in specific apoproteins may be associated with an increase or a decrease in the functional properties of cytochrome P-450.

3688 ADAPTIVE CHANGES OF RAT LIVER CELLS INDUCED BY REPEATED INTRAPERITONEAL INJECTIONS OF D-GALACTOSAMINE. I. LIGHT MICROSCOPIC, AUTORADIOGRAPHIC AND BIOCHEMICAL STUDIES OF PARENCHYMAL ALTERATION, DNA AND RNA SYNTHESIS.

(Eng.) Schuchhardt, C.; Felgenhauer, K.; Wagner, T. W.; Enzan, H.; Lesch, R. (Dept. Pathology, Univ. Freiburg, Albertstrasse 19, D-7800 Freiburg, W. Germany). *Virchows Arch.* [*Cell Pathol.*] 26(1):43-57; 1977.

To examine the effects of repeated D-galactosamine administration (GalN) on rat livers (i.e., the effects of subacute intoxication), Wistar rats were treated daily with GalN (250 mg/kg) after an initial injection of GalN (375 mg/kg). The interval for this investigation was between 1 hr and 30 days. After the first GalN injection, the light microscopic features of a toxic hepatitis were seen. Following daily repeated GalN injections, the amount of parenchymal necroses as well as the extent of inflammatory infiltration disappeared stepwise, indicating that during this subacute stage of intoxication the reaction pattern of the liver tissue had changed. UDP glucose as well as UDP + UTP trapping was observed 6 hr after a single GalN injection followed by values comparable to those of the controls after eight daily injections. The RNA content per gram of liver did not show any fluctuation after a single or repeated GalN injections. Using ^{3}H-cytidine as a radioactive precursor, however, RNA synthesis during the acute stage of intoxication was shown to be strongly decreased, while the following daily injections led to enhanced RNA synthesis. During the acute stage, the decreased RNA synthesis could be raised to normal values by an additional injection of unlabeled uridine. The DNA content per gram liver did not show any remarkable changes. The incorporation rates of ^{3}H-thymidine were increased three- to fourfold after daily GalN injections. The autoradiographs revealed nearly identical labeling indices of hepatocytes as well as Kupffer cells; these indices were 20- to 30-fold greater than those in controls. The findings indicate important differences between GalN-induced alterations in the acute stage of intoxication and those in the subacute stage following repeated injections. These differences may be explained as an adaptation to repeated GalN intoxication.

3689 AGE DEPENDENT KINETIC STUDIES OF CYTOPLASMIC AND LYSOSOMAL ENZYMES OF THE NORMAL AND D-GALACTOSAMINE INJURED RAT LIVER.

(Eng.) Platt, D.; Forster, K.; Forster, L. (Center Internal Medicine, Justus Liebig-Univ. Giessen, W. Germany). *Mech. Ageing Dev.* 7(3):183-188; 1978.

Studies were carried out in female SIV rats of two age groups (6 weeks and 30 months) to determine if there are age-dependent differences in the development and treatment of galactosamine hepatitis. The rats received (a) a single dose of D-galactosamine (GalN, 600 mg, i.p.) or (b) a single dose of GalN as in (a) plus prednisolone (20 mg/kg, s.c.) at the beginning of the experiment. The kinetic studies disclosed that GalN produced more severe changes in old than in young animals, represented by the activities of cytoplasmic (SGOT and SGPT) and lysosomal (β-acetylglucosaminidase, β-glucuronidase, cathepsin D) enzymes. Prednisolone diminished the morphological liver changes as well as the biochemical disturbances in young rats. There was only a protecting effect in morphological changes of old animals within the first 12 hr. The prevention of cytoplasmic enzyme activity increase was limited to the first 12 hr. These studies show that morphological and biochemical alterations are more severe in old than young animals.

3690 ROLE OF URIDINE ENTRAPPED IN LIPOSOMES IN GALACTOSAMINE-INDUCED HEPATITIS. (Eng.)

Mathias, C.; Dorai, D. T.; Bachhawat, B. K. (Christian Medical Coll. Hosp., Vellore 632 004, India). *Ind. J. Biochem.* 14(2):142-146; 1977.

The therapeutic value of using the liposomes to deliver substances to liver cells was studied in galactosamine-induced hepatitis. A single i.p. injection of D-galactosamine to female rats produced morphological changes in the liver that closely resembled those observed in human viral hepatitis. The damage was dose-dependent. The dose of D-galactosamine required to produce minimal liver glycogen levels (1.5 ± 0.9 mg/g) was 75 mg/kg. The i.v. administration of free uridine (0.04 mg/g) 30 min after the injection of D-galactosamine (75 mg/kg) slightly decreased the glycogen depletion, resulting in values of 6.4 ± 1.1 mg/g of liver tissue. The same dose of uridine entrapped in three different types of liposomes was then administered to rats treated with the standard dose of D-galactosamine. Animals treated with liposomes containing either stearylamine or dicetylphosphate failed to produce a protective effect on the liver glycogen levels (0.8 ± 0.2 mg/g and 5.1 ± 1 mg/g, resp.) and liver morphology. In contrast, animals receiving phosphatidic acid-containing liposomes showed a marked regeneration of liver glycogen (25 ± 9 mg/g). The liver morphology was restored to near normal in the animals treated with phosphatidic acid-containing liposomes. The liposomes may be of value for transporting substances to the hepatocytes in the treatment of viral hepatitis.

3691 MALIGNANT TUMORS IN RATS FED NAFENOPIN, A HEPATIC PEROXISOME PROLIFERATOR. (Eng.)

Reddy, J. K.; Rao, M. S. (Northwestern Univ. Medical Sch., Chicago, IL 60611). *J. Natl. Cancer Inst.* 59(6):1645-1650; 1977.

The carcinogenicity of the hypolipemic hepatic peroxisome proliferator, nafenopin (2-methyl-2-[*P*-(1,2,3,4-tetrahydro-1-naphthyl)phenoxy]propionic acid; Su-13,437) was tested in 15 male F344 rats. The animals received nafenopin at a dietary concentration of 0.1% until the end of the experiment at 25 months. Between 18 and 25 months, 12 of 15 rats developed tumors. Eleven of the 15 rats developed hepatocellular carcinomas, and 3/15 developed pancreatic acinar cell tumors, including 1 metastasizing carcinoma. The hepatocellular carcinomas as well as the acinar cell carcinoma of the pancreas were successfully transplantable through six generations. These studies confirm the carcinogenicity of nafenopin in F344 rats.

3692 HEPATOTOXICITY OF SALICYLATES IN MONOLAYER CELL CULTURES. (Eng.)

Tolman, K. G.; Peterson, P.; Gray, P.; Hammar, S. P. (Univ. Utah Coll. Medicine, 50 N. Medical Drive, Salt Lake City, UT 84132). *Gastroenterology* 74(2, Part 1):205-208; 1978.

The influence of graded doses of sodium salicylate (10, 20, 30, 40, and 50 mg/dl) on rat liver cells cultured in monolayers was assessed by measuring lactic dehydrogenase activity in culture media after cell incubation. Morphological alterations were studied by electron microscopy. The influence of different albumin concentrations in the media on toxicity was also evaluated. Lactic dehydrogenase concentrations rose with increasing doses of salicylate up to 40 mg/dl. High albumin concentrations were associated with reduced salicylate toxicity. These findings suggest that salicylate-induced hepatic injury is dose related and may be influenced by serum albumin levels.

3693 EFFECT OF ACUTE UREMIA ON ARGININE METABOLISM AND UREA AND GUANIDINO ACID PRODUCTION BY PERFUSED RAT LIVER. (Eng.)

Perez, G. O.; Rietberg, B.; Owens, B.; Schiff, E. R. (Miami Veterans Admin. Hosp., 1201 N.W. 16th St., Miami, FL 33125). *Pfluegers Arch.* 372(2):275-278; 1977.

The effect of an acute loss of renal function on the hepatic metabolism of arginine and other urea cycle intermediates was investigated. Since arginine is a precursor of urea and other guanidino derivatives, its metabolism was studied in acute uremia using the isolated perfused rat liver. Female Sprague-Dawley rats underwent bilateral nephrectomy or sham operation 48 hr prior to liver perfusion. [Gaunidino ^{14}C]arginine (50 μCi) and unlabeled arginine and aspartic acid were added to the recycling perfusate 15 min prior to liver perfusion. Perfusate concentrations of urea and other guanidino derivatives were measured with high-pressure liquid chromatography. After the initial 30 min of perfusion, net uptake of arginine was lower, and net release of guanidino-succinic acid (GSA) was higher in the livers of acutely uremic rats. Net release of urea was also higher in uremia but the results did not achieve statistical significance. In uremia, the percentage conversion of ^{14}C arginine to ^{14}C urea was significantly ($p < 0.05$) higher (79 ± 5%) than in controls (58 ± 7%). These results demonstrate increased GSA production by livers of acutely uremic rats and suggest that acute uremia may be associated with increased arginine utilization and increased production of urea.

3694 ALTERATIONS OF RAT LIVER SUBSEQUENT TO HEAT OVERLOAD. (Eng.) Bowers, W. D., Jr.; Hubbard, R. W.; Leav, I.; Daum, R.; Conlon, M.; Hamlet, M. P.; *et al.* (US Army Res. Inst. Environmental Medicine, Natick, MA 01760). *Arch. Pathol. Lab. Med.* 102(3):154-157; 1978.

Specimens were taken from the liver in male Sprague-Dawley rats during a study to assess the rat as a model for human heat stroke. Tissues from four groups of rats were processed for light and electron microscopy. The groups consisted of control rats, rats run to exhaustion at 5 C, rats exhausted at 26 C, and rats restrained at 41.5 C until their rectal temperatures reached 42.3 C. Exhaustive exercise at 5 C produced neither fatalities nor pathological changes in the livers. Exhaustive exercise at 26 C and restraint at 41.5 C were fatal for most rats. Histological and/or ultrastructural changes, which included centrilobular necrosis, vacuolization and diminution of hepatocellular microvilli, and loss of sinusoidal endothelium, were observed in livers from rats that were run to exhaustion at 26 C and from those rats restrained at 41.5 C. This work supports the validity of the rat model, since human heat stroke results in similar hepatic changes.

3695 CONTROL OF ASCITES ABSORPTION IN ANESTHETIZED CATS: EFFECTS IN INTRAPERITONEAL PRESSURE, PROTEIN, AND FUROSEMIDE DIURESIS. (Eng.) Zink, J.; Greenway, C. V. (Faculty Medicine, Univ. Manitoba, 770 Bannatyne Ave., Winnipeg, Manitoba R3E OW3, Canada). *Gastroenterology* 73(5):1119-1124; 1977.

A plethysmographic technique was utilized to record the rate of absorption of fluid from the peritoneal cavity of anesthetized cats. In 33 cats, the rate of fluid absorption from the peritoneal cavity was directly proportional to the intraperitoneal pressure regardless of whether the intraperitoneal fluid was free from protein or contained a protein concentration equivalent to that of plasma. Fluid was absorbed with a protein concentration equivalent to that present in the peritoneal cavity. Thus, the intraperitoneal pressure is apparently an important factor controlling the accumulation of ascitic fluid, but the protein concentration of the intraperitoneal fluid does not affect the rate of reabsorption. In addition, marked diuresis induced by i.v. furosemide (3.1 mg/kg) did not appear to mobilize ascites by an effect on the reabsorption process.

3696 IMMUNOFLUORESCENCE MICROSCOPY IN EXPERIMENTALLY INDUCED, TYPE B HEPATITIS IN THE CHIMPANZEE. (Eng.) Hoofnagle, J. H.; Michalak, T.; Nowoslawski, A.; Gerety, R. J.; Barker, L. F. (Veterans Admin. Hosp., 50 Irving St., N.W., Washington, DC 20422). *Gastroenterology* 74(2, Part 1):182-187; 1978.

Sequential liver biopsies from five chimpanzees with experimentally-induced, acute type B hepatitis were studied for immunofluorescence (IF) reactivity. In general, IF for hepatitis B surface antigen (HBsAg) and hepatitis B core antigen (HBcAg) appeared early in the course of the infection, shortly after the first appearance of HBsAg in the serum, and well before the onset of elevated transaminase values and light microscopy histopathological changes on liver biopsies. IF reactivity usually disappeared at the time of peak transaminase elevations and liver cell morphological changes, but before the disappearance of serum HBsAg. The pattern of IF reactivity, whether predominantly HBsAg or HBcAg or both, remained constant over the course of the infection for any one chimpanzee and did not appear to be correlated with clinical severity or the presence or absence of the hepatitis B virus-related e antigen. The occurrence of peak liver enzyme elevation and clinical disease at the time of disappearance or diminution of hepatic HBsAg and HBcAg expression, and not at the time of peak in IF reactivity, is consistent with the concept that tissue injury in type B hepatitis is not the result of a direct cytopathic effect of the virus, but is rather the result of an indirect, host-mediated effect involved in the immune clearance of these viral antigens.

3697 INHIBITORY EFFECTS OF JAUNDICE ON REGENERATING LIVER. (Eng.) Yamamoto, M.; Yamada, T.; Ida, T.; Ozawa, K. (Kyoto Univ., Faculty Medicine, 54-Kawaramachi, Shogoin, Sakyo-ku, Kyoto 606, Japan). *Res. Exp. Med. (Berl.)* 171(2):121-128; 1977.

The effects of partial hepatectomy on energy charge (ATP+1/2ADP/ATP+ADP+AMP) and mitochondrial oxidative phosphorylation were studied in normal and jaundiced Wistar rats. In normal rats the energy charge levels of the remnant liver decreased only slightly with a rise in the phosphorylative activity of the mitochondria at an early stage after hepatectomy, and then rapidly returned to normal. In rats in which jaundice was induced by common bile duct ligation, the energy charge levels of the liver decreased to approximately 0.800 from a normal value of about 0.849, although their mitochondrial oxidative phosphorylation was within normal limits. In jaundiced rats, the energy charge levels of the remnant liver after partial hepatectomy decreased markedly without a return toward normal. The mitochondrial phosphorylative activity increased to only about 50% of hepatectomized normal rats after partial hepatectomy. More than 70% of jaundiced rats died within 24 hr after partial hepatectomy. It is suggested that jaundice inhibits the enhancement of mitochondrial ATP generation that is usually seen in regenerating liver and that is necessary to provide sufficient energy for the energy-requiring biosynthetic process as in the early process of liver regeneration.

3698 EFFECT OF CHRONIC RENAL FAILURE IN RATS ON STRUCTURE AND FUNCTION OF THE HEPATIC ENDOPLASMIC RETICULUM. (Eng.) Black, M.; Biempica, L.; Goldfischer, S.; Grossman, S.; Arias, I. M. (Temple Univ. Sch. Medicine, 3420 N. Broad St., Philadelphia, PA 19140). *Exp. Mol. Pathol.* 27(3): 377-391; 1977.

To determine whether features associated with the uremic syndrome in liver disease could be related to changes in the function of the hepatic endoplasmic reticulum, functional, histochemical, and ultrastructural studies of the liver were performed in rats rendered chronically azotemic following unilateral nephrectomy and segmental infarction of the remaining kidney. Zoxazolamine paralysis time (6.6 ± 0.3 hr) and ketamine narcosis time (50.0 ± 3.0 min) in rats with renal failure were prolonged in comparison with sham operated controls (4.2 ± 0.2 hr and 40.2 ± 4.3 min, resp.; $p<0.01$ and $p>0.01$, resp.). Cytochrome P-450 content and benzphetamine and aminopyrine demethylase activities were decreased in the animals with renal failure, and *o*-aminophenol uridine diphosphate-glucuronyl transferase activity was unaltered. Histochemical examination of the liver by light microscopy revealed little abnormality except for lipid accumulation associated with increased serum cholesterol and triglyceride concentrations. Electron microscopy demonstrated alterations in endoplasmic reticulum and lysosomes. Dichloroethane treatment of uremic rats prevented the ultrastructural changes and enhanced drug metabolizing enzyme systems. These observations indicate that experimental chronic renal failure influences the structure and function of the hepatic endoplasmic reticulum and support the hypothesis that some features of the uremic syndrome in man may result from altered hepatic subcellular function.

3699 STUDIES ON THE EFFECT OF LONG-TERM EXPOSURE TO NITROGEN DIOXIDE ON SERUM AND LIVER PROTEINS LEVEL AND ENZYME ACTIVITY IN GUINEA PIGS. (Eng.) Drozdz, M.; Kucharz, E.; Ludyga, K.; Molska-Drozdz, T. (Silesian Medical Sch., Sosnowiec, Poland). *Eur. J. Toxicol.* 9(5):287-293; 1976.

3700 THE IMPORTANCE OF BICARBONATE TRANSPORT IN THE BILE SALT INDEPENDENT FRACTION (BSIF) OF CANALICULAR BILE FLOW [Abstract]. (Eng.) Hardison, W. G.; Wood, C. A. (Veterans Admin. Hosp., San Diego, CA). *Gastroenterology* 73(5):1223; 1977.

3701 ESTIMATING HEPATIC TRANSFER COEFFICIENTS FROM THE PLASMA DISAPPEARANCE CURVE: THE ERRORS INVOLVED IN ASSUMING HOMOGENEOUS COMPARTMENTS [Abstract]. (Eng.) Forker, E. L.; Luxon, B.; Gibson, J. (Dept. Medicine, Univ. Iowa, Iowa City, IA). *Gastroenterology* 73(5):1220; 1977.

3702 HEPATIC FORMATION OF URSODEOXYCHOLIC AND CHENODEOXYCHOLIC ACID FROM 7-KETOLITHOCHOLIC ACID IN MAN [Abstract]. (Eng.) Fromm, H.; Farivar, S.; Carlson, G. L.; Hofmann, A. F.; Amin, P. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA). *Gastroenterology* 73(5):1221; 1977.

3703 THE ROLE OF RIBONUCLEIC ACID IN CHOLINE DEFICIENCY CIRRHOSIS OF THE RAT [Abstract]. (Eng.) Strickland, R. D. (Veterans Admin. Hosp., Albuquerque, NM). *Gastroenterology* 73(5):1249; 1977.

3704 HETEROGENEITY OF RAT LIVER PARENCHYMAL CELLS STUDIED USING SEDIMENTATION VELOCITY ANALYSIS [Abstract]. (Eng.) Sweeney, G. D. (Dept. Medicine, McMaster Univ., Hamilton, Ontario, Canada). *Gastroenterology* 73(5):1249; 1977.

3705 CHANGES IN REGIONAL DISTRIBUTION OF HEPATIC BLOOD FLOW (RDHBF): INFLUENCE ON BILE ACID INDEPENDENT BILE FLOW (BAIF) [Abstract]. (Eng.) Tavoloni, N.; Reed, J. S.; Rezai-Zadeh, K.; Boyer, J. L. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Gastroenterology* 73(5):1249; 1977.

3706 ACETALDEHYDE SELECTIVELY IMPAIRS GLYCOPROTEIN METABOLISM [Abstract]. (Eng.) Tuma, D. J.; Sorrell, M. F. (Univ. Nebraska Medical Center, Omaha, NB). *Gastroenterology* 73(5):1250; 1977.

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3709 STEREOSPECIFIC 26-HYDROXYLATION IN THE BIOSYNTHESIS OF CHENODEOXYCHOLIC ACID [Abstract]. (Eng.) Shefer, S.; Cheng, F. W.; Salen, G.; Mosbach, E. H. (Public Health Res. Inst., New York, NY). *Gastroenterology* 73(5):1247; 1977.

3710 EFFECT OF PROTEIN DEPLETION AND REPLETION ON LIVER ULTRASTRUCTURE, PROTEIN CONTENT, SERUM LIPIDS, AND SERUM PROTEINS [Abstract]. (Eng.) Steiger, E.; O'Neill, M.; Hermann, R.; Sebek, B.; Naito, H. K. (Cleveland Clinic Foundation, Cleveland, OH 44106). *Gastroenterology* 73(5):1248; 1977.

3711 INDUCTION OF LYMPHOCYTE CYTOTOXICITY BY A PROTEIN IN THE SURFACE MEMBRANE OF MAM-

MALIAN HEPATOCYTES [Abstract]. (Eng.) Vierling, J. M.; Steer, C. J.; Hickman, J.; Jones, E. A. (Natl. Inst. Arthritis, Metabolic, Digestive Diseases, Natl. Inst. Health, Bethesda, MD). *Gastroenterology* 73(5):1252; 1977.

3712 THE ROLE OF HEPATOCELLULAR LYSOSOMES IN LIVER INJURY IN THE HEPATIC COPPER TOXICOSIS OF BEDLINGTON TERRIERS [Abstract]. (Eng.) Twedt, D. C.; Sternlieb, I.; Stockert, R. J.; Morell, A. G.; Grushoff, P.; Johnson, G. F.; *et al.* (Albert Einstein Coll. Medicine, New York, NY). *Gastroenterology* 73(5):1251; 1977.

3713 ROLE OF LIGANDIN IN THE TRANSFER OF BILIRUBIN FROM PLASMA INTO THE LIVER [Abstract]. (Eng.) Wolkoff, A. W.; Sellin, J.; Gatmaitan, Z.; Goresky, C. A.; Arias, I. M. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 73(5):1255; 1977.

3714 ^{35}S-BSP BINDING BY PURIFIED RAT LIVER CELL PLASMA MEMBRANE SUBFRACTIONS [Abstract]. (Eng.) Wolkoff, A. W.; Arias, I. M. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 73(5):1255; 1977.

3715 URSODEOXYCHOLATE TOXICITY IN RABBITS [Abstract]. (Eng.) Wolfson, M.; Miyai, K.; Javitt, N. B. (Cornell Univ. Medical Coll., New York, NY). *Gastroenterology* 73(5):1255; 1977.

3716 ETHANOL KINETICS (EK) AND FATTY LIVER (FL): DIFFERENCES OBSERVED AFTER ACUTE AND CHRONIC WINE (W) CONSUMPTION [Abstract]. (Eng.) Wilson, C.; Morgan, D.; Mendenhall, C. (Veterans Admin. Hosp., Cincinnati, OH). *Gastroenterology* 73(5):1255; 1977.

3717 STRUCTURAL AND METABOLIC EFFECTS OF CARBON TETRACHLORIDE ADMINISTRATION IN THE RAT [Abstract]. (Eng.) O'Donovan, D. J.; Dunne, T. M. (Dept. Physiology, Univ. Coll., Galway, Ireland). *J. Anat.* 124(2):490; 1977.

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3719 IMMUNOLOGICAL ABNORMALITIES ASSOCIATED WITH EXPERIMENTAL TOXIC LIVER INJURY [Abstract]. (Eng.) Smith, C. I.; Powell, L. W. (Royal Brisbane Hosp., Brisbane 4029, Australia). *Clin. Exp. Pharmacol. Physiol.* 4(5):464-465; 1977.

3720 DYNAMICS OF LIVER COLLAGEN SYNTHESIS IN CCl_4-TREATED RATS [Abstract]. (Eng.) Ehrinpreis, M.; Rojkind, M.; Giambrone, M. A. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 73(5):1219; 1977.

3721 CARRIER-MEDIATED TRANSPORT OF OUABAIN IN ISOLATED RAT HEPATOCYTES [Abstract]. (Eng.) Eaton, D. L.; Klaassen, C. D. (Univ. Kansas Medical Center, Kansas City, KS). *Gastroenterology* 73(5):1218; 1977.

3722 LIVER COLLAGEN SYNTHESIS IN SCHISTOSOMIASIS [Abstract]. (Eng.) Dunn, M. A.; Kamel, R.; Kamel, I.; Hait, P. K.; Biempica, L.; Wu, C. H.; Rojkind, M. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 73(5): 1218; 1977.

3723 HEPATIC KUPFFER CELL ALTERATIONS INDUCED BY GLUCAN [Abstract]. (Eng.) Di Luzio, N. R.; McNamee, R.; Jones, E.; Rodrigue, J.; Gilbert, K.; Cook, J.; *et al.* (Tulane Univ. Sch. Medicine, New Orleans, LA). *Gastroenterology* 73(5):1218; 1977.

3724 RAT LIVER TRYPTOPHAN PYRROLASE (TP) ACTIVITY: EFFECT OF TRYPTOPHAN (T) IN SELENIUM (Se)-DEFICIENCY [Abstract]. (Eng.) Correia, M. A.; Burk, R. F. (Dept. Medicine, Univ. California, San Francisco, CA). *Gastroenterology* 73(5):1217; 1977.

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3726 BILIRUBIN MONOGLUCURONIDE TRANSGLUCURONIDASE: SOLUBILIZATION, PARTIAL PURIFICATION AND RESPONSE TO DRUGS AND CHEMICALS [Abstract]. (Eng.) Chowdhury, J. R.; Bhargava, M.; Fischberg, E.; Arias, I. M. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 73(5):1216; 1977.

3727 SEX RELATED DIFFERENCES IN HEPATIC CHOLESTEROL AND BILE ACID METABOLISM [Abstract]. (Eng.) Carlson, S. E.; Mitchell, A. D.; Goldfarb, S. (Univ. Wisconsin Sch. Medicine, Madison, WI 53706). *Gastroenterology* 73(5):1215; 1977.

3728 LIGANDIN: SUBUNITS AND FUNCTION [Abstract]. (Eng.) Bhargava, M.; Listowsky, I.; Arias, I. M. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *Gastroenterology* 73(5):1213; 1977.

3729 HYPERSENSITIVITY OF THE BRAIN TO PENTOBARBITAL IN THE RAT WITH PORTACAVAL SHUNT (PCS) [Abstract]. (Eng.) Bircher, J.; Kupfer, A. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Gastroenterology* 73(5):1214; 1977.

3730 FRUCTOGENESIS BY LIVER-DERIVED CELLS IN CULTURE [Abstract]. (Eng.) Bissell, D. M.; Levine, G. A.; Bissell, M. J. (Dept. Medicine, Univ. California, San Francisco, CA). *Gastroenterology* 73(5):1214; 1977.

3731 GROWTH OF RAT LIVER IN RESPONSE TO EPIDERMAL GROWTH FACTOR (EGF) AND PANCREATIC HORMONES [Abstract]. (Eng.) Bucher, N. L. R.; Patel, U. (Massachusetts General Hosp., Boston, MA). *Gastroenterology* 73(5):1214; 1977.

3732 MALFORMATIONS OF INTRAHEPATIC BILE DUCTS INDUCED BY INTRAUTERINE EXPOSURE TO LITHOCHOLATE [Abstract]. (Eng.) Bujanover, Y.; Thaler, M. M. (Dept. Pediatrics, Univ. California, San Francisco, CA). *Gastroenterology* 73(5):1214; 1977.

3733 ACETALDEHYDE MEDIATES THE ETHANOL-INDUCED DECREASE IN LIVER MICROTUBULES [Abstract]. (Eng.) Baraona, E.; Matsuda, Y.; Salaspuro, M.; Finkelman, F.; Lieber, C. S. (Bronx Veterans Admin. Hosp., Bronx, NY). *Gastroenterology* 73(5):1212; 1977.

3734 METABOLIC EFFECTS OF FOLIC ACID ADMINISTRATION ON GALACTOSE BY THE ISOLATED PERFUSED SUCKLING RAT LIVER [Abstract]. (Eng.) Berman, W.; Rogers, S.; Bautista, J.; Segal, S. (Children's Hosp., Philadelphia, PA). *Gastroenterology* 73(5):1212; 1977.

3735 HEPATIC PYRIDOXINE METABOLISM AND ITS RELATIONSHIP TO THE PLASMA CONTENT OF B_6 VITAMERS [Abstract]. (Eng.) Li, T. K.; Lumeng, L. (Indiana Univ. Sch. Medicine, Indianapolis, IN). *Clin. Res.* 25(4):572A; 1977.

3736 MODIFICATION OF CARBON TETRACHLORIDE INDUCED HEPATIC INJURY BY CIMETIDINE [Abstract]. (Eng.) Leibowitz, A. I.; Stelzer, F.; Nolan, J. P. (Dept. Medicine, State Univ. New York, Buffalo, NY). *Clin. Res.* 25(4):572A; 1977.

3737 ACETALDEHYDE IRREVERSIBLY IMPAIRS GLYCOPROTEIN METABOLISM IN LIVER SLICES [Abstract]. (Eng.) Jennett, R. B.; Tuma, D. J.; Sorrell, M. F. (Univ. Nebraska Medical Center, Omaha, NB). *Clin. Res.* 25(4):571A; 1977.

3738 HEPATOTOXIC INTERACTION BETWEEN MESTRANOL (ME) AND TAUROCHOLATE (TC) [Abstract]. (Eng.) Dujovne, C. A.; Salhab, A. (Univ. Kansas Medical Center, Kansas City, KN). *Clin. Res.* 25(4):571A; 1977.

3739 BILE ACID SULFATASE ACTIVITY IN THE RAT [Abstract]. (Eng.) Palmer, R. H.; LaRusso, N. F. (Rockefeller Univ., New York, NY). *Clin. Res.* 25(4):608A; 1977.

3740 SPECIFICITY OF ACTION AND DIURNAL RHYTHM OF HEPATIC REGENERATIVE STIMULATOR SUBSTANCE (SS) [Abstract]. (Eng.) LaBrecque, D. R.; Bachur, N. R. (Baltimore Cancer Res. Center, Natl. Cancer Inst., Baltimore, MD). *Clin. Res.* 25(4):608A; 1977.

3741 HEPATIC VITAMIN D 25-HYDROXYLASE: INHIBITION BY BILE DUCT LIGATION OR BILE SALTS IN VITRO [Abstract]. (Eng.) Bolt, M.; Sitrin, M.; Favus, M.; Rosenberg, I. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Clin. Res.* 25(4):606A; 1977.

3742 REOVIRUS MURINE MODEL FOR BILIARY ATRESIA [Abstract]. (Eng.) Bangaru, B. S.; Gartner, L. M.; Morecki, R.; Udem, S.; Goldfischer, S.; Horwitz, M. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 73(5):1211; 1977.

3743 CYTOTOXIC EFFECT OF A PEROXIDASE-H_2O_2-HALIDE SYSTEM ON LIVER CELLS [Abstract]. (Eng.) Lumeng, L. (Indiana Univ. Sch. Medicine, Indianapolis, IN). *Gastroenterology* 73(5):1232; 1977.

3744 ACID HYDROLASES IN RAT BILE: HEPATOCYTE EXOCYTOSIS OF LYSOSOMAL PROTEIN [Abstract]? (Eng.) LaRusso, N. F.; Fowler, S. (Dept. Biochemical Cytology, Rockefeller Univ., New York, NY). *Gastroenterology* 73(5):1230; 1977.

3745 EVIDENCE THAT BILE ACIDS ARE A DETERMINANT OF THE LOBULAR GRADIENT FOR CANALICULAR BILE SECRETION [Abstract]. (Eng.) Layden, T. J.; Boyer, J. L. (Univ. Illinois, Chicago, IL). *Gastroenterology* 73(5):1231; 1977.

3746 THE CONTRASTING EFFECTS OF TAUROCHOLATE (TC) ON PHOSPHOLIPID (PHOS) AND PROTEIN (PROT) EXCRETION INTO BILE [Abstract]. (Eng.) Layden, T. J.; Poppe, L. (Univ. Illinois, Chicago, IL). *Gastroenterology* 73(5):1231; 1977.

3747 DEFICIENCY OF HEPATIC ACTIVATED AND SYNTHESIZED TRIGLYCERIDE LIPASES IN THE PATHOGENESIS OF LIPOPROTEIN REMNANT ACCUMULATION IN GALACTOSAMINE (GalN) HEPATITIS [Abstract]. (Eng.) Kinnard, M. S.; Sabesin, S. M. (Div.

Gastroenterology, Univ. Tennessee, Memphis, TN). *Gastroenterology* 73(5):1228; 1977.

3748 ALTERATIONS IN DRUG KINETICS DURING CHOLESTASIS: DIFFERENCES BETWEEN A CATIONIC AND ANIONIC DRUG [Abstract]. (Eng.) Knodell, R. G.; Brooks, D. A.; Allen, R. C.; Kyner, W. T. (Albuquerque Veterans Admin. Hosp., Albuquerque, NM). *Gastroenterology* 73(5):1228; 1977.

3749 TISSUE AND URINARY GLYCOSAMINOGLYCANS (GAG) CHANGES IN HEPATIC FIBROSIS [Abstract]. (Eng.) Kupchella, C. E.; Jarvis, J. O.; Curran, K. L.; Greenberg, R. A.; Tamburro, C. H. (Univ. Louisville Sch. Medicine, Louisville, KY). *Gastroenterology* 73(5):1229; 1977.

3750 ENANTIOMERS AS MOLECULAR PROBES FOR IN VIVO CHARACTERIZATION OF HEPATIC MICROSOMAL ENZYMES [Abstract]. (Eng.) Kupfer, A.; Schlunegger, U. P.; Bircher, J. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Gastroenterology* 73(5):1229; 1977.

3751 INHIBITION OF RAT LIVER LYSOSOMAL COLLAGENASE BY PLASMA FROM CIRRHOTIC RATS [Abstract]. (Eng.) Henley, K. S.; Laughrey, E. G. (Univ. Michigan Medical Sch., Ann Arbor, MI). *Gastroenterology* 73(5):1224; 1977.

3752 LIVER SUPPORT SYSTEM: THE LOW CLEARANCE OF MODEL HEPATIC EXCRETORY ANIONS BY CHARCOAL HEMOPERFUSION [Abstract]. (Eng.) Hew, J. T.; Hart, F. E.; Willson, R. A. (Dept. Medicine, Univ. Washington, Seattle, WA). *Gastroenterology* 73(5):1225; 1977.

3753 CHLORPROMAZINE (CPZ) ALTERS HEPATIC MEMBRANE ULTRASTRUCTURE DURING INHIBITION OF BILE ACID INDEPENDENT FLOW (BAIF) IN THE ISOLATED PERFUSED RAT LIVER (IPRL) [Abstract]. (Eng.) Hruban, Z.; Tavoloni, N.; Reed, J. S.; Boyer, J. L. (Dept. Pathology, Univ. Chicago, Chicago, IL). *Gastroenterology* 73(5):1226; 1977.

3754 INDUCTION OF CYTOCHROME P-450 IN A SELECTIVE SUB-POPULATION OF RAT HEPATOCYTES [Abstract]. (Eng.) Gumucio, J. J.; DeMason, L. J.; Miller, D. L.; Krezoski, S. O. (Dept. Internal Medicine, Univ. Michigan, Ann Arbor, MI). *Gastroenterology* 73(5):1223; 1977.

3755 SEX DIFFERENCES IN HEPATIC SULFATION OF TAUROLITHOCHOLIC ACID [Abstract]. (Eng.) Hammerman, K.; Chen, L.; Fernandez, A.; Earnest, D. (Dept. Medicine, Univ. California, San Francisco, CA). *Gastroenterology* 73(5):1223; 1977.

3756 EXPERIMENTAL DISEASES INDUCED BY GALACTOSE ANALOGS [Abstract]. (Eng.) Keppler, D.; Starling, J. J.; Lattke, H.; Smith, D. F. (Biochemisches Institut, Universitat Freiburg, Hermann-Herder-Str. 7, D-7800 Freiburg i. Br., W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1229; 1977.

3757 EXPERIMENTAL PRODUCTION OF WHITE BILE IN BILIARY OBSTRUCTION [Abstract]. (Eng.) Kent, S. J. S.; Jackson, B. T. (St. Thomas' Hosp., London, England). *Gut* 18(11):A956-A957; 1977.

3758 LOSS OF CEREBRAL AUTOREGULATION IN AN ANIMAL MODEL OF LIVER FAILURE [Abstract]. (Eng.) Trewby, P. N.; Hanid, M. A.; Mackenzie, R. L.; Mellon, P. J.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Gut* 18(11):A953; 1977.

See also, 3474, 3535, 3540, 3541, 3615, 3629, 3797, 3820, 3828, 3830, 3839, 3853, 4132, 4155, 4191, 4231, 4232.

SECRETION AND METABOLISM

Intestine

3759 TANNIC ACID AND OXIDIZED TANNIC ACID ON THE FUNCTIONAL STATE OF RAT INTESTINAL EPITHELIUM. (Eng.) Mitjavila, S.; Lacombe, C.; Carrera, G.; Derache, R. (INSERM- U.87, Institut de Physiologie, 2 Rue Francois Magendie 31400, Toulouse, France). *J. Nutr.* 107(12):2113-2121; 1977.

To ascertain the origin of fecal nitrogen and the effect of tannic acid on the intestinal mucosa, diets containing tannic acid (3% of dry matter) were fed to male Wistar rats for 33 days. To explain the effect of oxidation of tannins, diets containing oxidized tannic acid or tannic acid associated with an antioxidant (sodium sulfite) at the level of 1% of dry matter were also administered. The increased excretion of sialic acid (from

2.209 ± 0.0583 to 3.03 ± 0.140 g, $p<0.001$) and glucosamine (from 0.215 ± 0.0147 to 0.400 ± 0.0139 g, $p<0.001$) during tannic acid ingestion indicated that the excess of fecal nitrogen mainly corresponds to the mucus hypersecretion observed by histology. Fecal analysis revealed perturbations in movements of water and ions. The study of the metabolic activity of isolated enterocytes and the activity of some enzymes in a homogenate of these cells showed an inhibition of oxygen consumption and succinic dehydrogenase activity. The addition of sodium sulfite to the diet had little effect on the action of tannic acid; however, the addition of previously oxidized tannin reduced the effects observed, particularly in the case of fecal nitrogen loss.

3760 SYNTHESIS OF MACROMOLECULES BY INTESTINAL CELLS INCUBATED WITH AMMONIA. (Eng.)

Topping, D. C.; Visek, W. J. (Biology Div., Oak Ridge Natl. Lab., P.O. Box Y, Oak Ridge, TN 37830). *Am. J. Physiol.* 233(4):E341-E347; 1977.

Studies were conducted to determine whether concentrations of ammonia normally present in the intestinal tract of mammals and birds alter synthesis of macromolecules in isolated intestinal epithelial cells and to gain information about the possible role of ammonia in determining the RNA and DNA content of intestinal cells when animals are maintained in a conventional environment. Mucosal cells isolated from the small intestine of chicks and rats were incubated with ammonia (10 mM). NH_4Cl treatment increased glucose metabolism in cells from both species. Ammonia stimulated incorporation of precursors into RNA and decarboxylation of orotic acid by cells isolated from chickens, but an increase in incorporation of precursors into DNA was not observed in cells from either species. Cultured embryonic chicken duodena showed increased incorporation of orotate into RNA with NH_4Cl added to the medium. Rats immunized against jack bean urease showed lower urease activity per gram of dry intestinal content, lower intestinal weight, lower mucosal cell and total gut protein, and less protein per unit weight of DNA in the mucosal cell fraction. The results support the conclusion that ammonia produced in the intestine by bacterial ureases causes significant changes in the content of RNA and protein in intestinal cells.

3761 EFFECTS OF COLCHICINE TREATMENT ON RAT INTESTINAL DISACCHARIDASE ACTIVITIES.

(Ger.) Hartwich, G.; Broll, R.; Domschke, W. (Medizinische Universitatsklinik Erlangen, D-852 Erlangen, W. Germany). *Exp. Pathol. (Jena)* 13(4/5):198-208; 1977.

The effect of colchicine treatment on maltase, lactase, β-fructofuranosidase, and cellobiase activities in the jejunal mucosa was studied in male Wistar rats free of specific pathogens. Colchicine was administered i.p. in single doses of 1 or 0.5 mg/kg or in five 0.1 mg/kg-doses at 24-hr intervals. The enzyme activities were measured at 24-hr intervals from the first until the 10th or 14th day, and were related to the tissue protein content. Both regimens of colchicine caused significant ($p<0.001$-0.01) reduction of all enzyme activities, which failed to return to normal during the observation period. The first decline in the enzyme activities lasted until the 2nd or 3rd day after administration, which was followed by an increase between days 2 and 3 or 3 and 4 and then a second drop. These considerable reductions of the enzyme activity were accompanied by slight microscopic changes only. Hydropic swelling of the cryptic cells was seen after 24 hr, partly associated with granular disorganization of the cytoplasm, necrosis of single cells, depletion of mucus in the goblet cells, and edema of the villous stroma. The crypts were enlarged. Mitoses were only seldom seen. The profile of the enzyme activities demonstrated the double action of colchicine (direct toxic injury of the enzymes in the differentiated cells of the villi and reduced supply of enzymes by the crypts due to the inhibiting action on mitosis), and the findings support the hypothesis that the cells developing by enhanced proliferation during the recovery phase have a still incomplete enzyme system. This latter fact may be the cause of the delayed restoration of the enzyme activities compared to the progress in morphological restoration. The findings indicate that colchicine treatment may cause reversible maldigestion of dietary disaccharides in man.

3762 PARALLEL BETWEEN CIRCADIAN RHYTHMS OF INTESTINAL DISACCHARIDASES AND FOOD INTAKE OF RATS UNDER CONSTANT LIGHTING CONDITIONS.

(Eng.) Nishida, T.; Saito, M.; Suda, M. (Ehime Univ. Sch. Medicine, Shigenobu, Onsen-gun, Ehime 791-02, Japan). *Gastroenterology* 74(2, Part 1): 224-227; 1978.

The relationship between the circadian rhythmic changes in the disaccharidase activities of the small intestine and the circadian feeding pattern was investigated in male Wistar rats kept in the dark or in the light continuously for 4 weeks. Rats kept continuously in the light and fed *ad libitum* showed no rhythmic change in food intake or disaccharidase activities, but when they were only fed during a restricted time of day (9 AM to 3 PM), their disaccharidase activities showed rhythmic changes with higher activities around the feeding time. In contrast, rats kept continuously in the dark and fed *ad libitum* showed circadian variations in food intake and disaccharidase activities essentially similar to rats kept under the normal light-dark lighting schedule. These findings show that the rhythm of disaccharidase activities is synchronized with the feeding rhythm, not with the lighting rhythm.

3763 BRUSH BORDER PEPTIDASES AND ARYLAMIDASES IN THE EXPERIMENTAL BLIND LOOP SYNDROME OF THE RAT.

(Eng.) Mazzacca, G.; Musella, S.; Andria, G.; D'Agostino, L.; Cimino, L.; Budillon, G. (Nuovo Policlinico, Via S. Pansini, I-80131, Napoli, Italy). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):364-367; 1977.

Peptidase and arylamidase activities were assessed in purified brush borders from the jejunum of Wistar rats with surgically created blind loops and in controls. The blind loop segment and the jejunum proximal and distal to the blind loop were studied. The blind loop syndrome was documented by the presence of macrocytic anemia. In rats with the blind loop syndrome, enzymatic activities that hydrolyze sucrose, L-leucyl-beta-naphthylamide, L-lysyl-beta-naphthylamide, alpha-L-glutamyl-beta-naphthylamide, L-phenylalanylalanine, and L-leucyl-glycine were significantly reduced as compared to those in controls ($p<0.001$). After a short course of antibiotic therapy (chloramphenicol, 100-150 mg/day, 7 days, p.o.), enzymatic activities returned to normal. These findings suggest that intestinal mucosal damage in rats with the blind loop syndrome is reversible.

3764 INDUCTION OF Na-K-ATPase IN PLASMA MEMBRANES OF RAT CECUM MUCOSA BY DIET: TIME COURSE AND KINETICS. (Eng.) Schiffl, H.; Loeschke, K. (Medizinische Klinik Innenstadt der Universitat Munchen, Ziemssenstrasse 1, D-8000 Munchen 2, W. Germany). *Pfluegers Arch.* 372(1):83-90; 1977.

Using cecum mucosa homogenates and cellular subfractions of male SPF Wistar rats, obtained by differential centrifugation, the process by which dietary polyethylene glycol (PEG) induces cecal Na$^+$-K$^+$-activated adenosine triphosphatase (Na-K-ATPase) activity was studied with respect to time course, subcellular distribution, and properties of the enzyme. In comparison with controls, Na-K-ATPase specific activity was stimulated in PEG-treated (160 g/1 in drinking water) rats in the total homogenate and in the microsomal (105,000 x *g*) sediment but not in the mitochondrial (9,000 x *g*) or nuclear (1,000 x *g*) sediment. The specific activity of Mg-ATPase did not change in any of the fractions. Na-K-ATPase induction was statistically significant after 2 days and complete after 1-2 weeks, in parallel with the previously described stimulation in net sodium absorption. Kinetic analysis showed V_{max} for ATP to be doubled while K_m for ATP, Na, and K as well as the optimal Mg/ATP ratio and K_i for ouabain remained unchanged. It is proposed that Na-K-ATPase and active sodium transport are closely associated in rat cecum and that dietary Na-K-ATPase stimulation is due to the induction of more enzyme molecules per unit basolateral cell membrane.

3765 ESTIMATION OF CHOLECYSTOKININ-PANCREOZYMIN (CCK) IN HUMAN PLASMA AND TISSUE BY A SPECIFIC RADIOIMMUNOASSAY AND THE IMMUNOHISTOCHEMICAL IDENTIFICATION OF PANCREOZYMIN-PRODUCING CELLS IN THE DUODENUM OF HUMANS. (Eng.) Schlegel, W.; Raptis, S.; Grube, D.; Pfeiffer, E. F. (Dept. Internal Medicine, Univ. Ulm, Ulm, W. Germany). *Clin. Chim. Acta* 80(2):305-316; 1977.

A reliable, sensitive, reproducible, and specific radioimmunoassay for cholecystokinin-pancreozymin (CCK), using rabbit antisera to highly purified porcine hormone, is described, and the assay was tested in humans. The naturally occurring variant of CCK (39-CCK, in which the ordinary CCK is lengthened from its *N*-terminus by a hexapeptide), labeled with ^{125}I and repurified by column chromatography on Sephadex G-10 and on SP-Sephadex C-25, was used as tracer. Separation of CCK from antibody-bound labeled 39-CCK was carried out using a double-antibody procedure. Nonspecific interference with the assay system was abolished by ethanol extractions. Highly purified porcine CCK was used as standard. No significant cross-reaction was found with gastrin, motilin, vasoactive polypeptide, gastric inhibitory polypeptide, natural and synthetic secretin, pancreatic glucagon, or insulin. The sensitivity of the assay is approximately 40 pg/ml of test solution. The mean plasma immunoreactive CCK concentration in 45 fasting normal subjects was 222 pg/ml, increasing after food ingestion to 480 pg/ml. Somatostatin abolished the stimulated CCK release. Elevated CCK concentrations were found in chronic pancreatitis. Immunohistochemical identification of pancreozymin cells was carried out either in surgical samples or in biopsy material. Approximately 1,650 CCK cells per cross-section were found in the human duodenum. The CCK cells usually appeared elongated, oval, or pyramidal in shape and were observed to reach the lumen with their apical cell pole. Further studies are required to elucidate the regulation mechanisms of pancreozymin release and its biological action.

3766 STUDIES ON THE RELEASE OF EXTRA-ANTRAL GASTRIN: EVIDENCE OF VAGAL INHIBITION IN THE DOG. (Eng.) Wheeler, M. H.; Bhattacherjee, S.; Psaila, J. V.; McLeish, A. R.; Poxom, V.; Owens, C.; *et al.* (Llandough Hosp., Nr. Penarth, S. Glam, Cardiff CF6 1XX, Wales). *World J. Surg.* 1(5):639-646; 1977.

The effect of resecting the gastrin-containing tissues of the antrum on basal and postprandial levels of serum gastrin was investigated in dogs. The effects of duodenal perfusion with saline and acetylcholine, and the effect of transthoracic vagotomy on serum gastrin concentrations were also investigated. Serum gastrin concentration was measured in three dogs after a meat meal; basal levels rose significantly after 10 min. After antrectomy with a Billroth I (BI), and later a Billroth II (BII) anastomosis, the basal gastrin levels were unchanged, but the rise after meat feeding was abolished. Four antrectomized dogs with a BII anastomosis and cannulae in both the duodenum and stomach were used to examine the effect of duodenal perfusion on serum gastrin. Whether the perfusate was 150 mM NaCl, 150 mM HCl, or 0.1% acetylcholine, the mean serum gastrin levels did not differ significantly from basal levels. Transthoracic vagotomy in antrectomized dogs produced a significant rise in basal gastrin levels (from 21 ± 3 pg/ml to 48 ± 3 pg/ml, $p<0.005$), but did not restore the response to a meat meal or duodenal perfusion. Parallel studies were conducted in six antrectomized, vagotomized patients who had undergone

Roux-en-Y conversion for postgastrectomy bilious vomiting, and in two patients after total gastrectomy. Duodenal perfusion via duodenostomy tubes with 150 mM NaCl, 150 mM HCl, fat emulsion, and an amino acid mixture did not raise serum gastrin above basal levels. Since meat feeding and duodenal perfusion in antrectomized dogs and humans failed to stimulate a rise in serum gastrin, the intestinal phase of gastric secretion is probably mediated by gastrin. The results following vagotomy in the dog suggest that extragastric basal gastrin release is vagally inhibited or that vagotomy interferes with the catabolic destruction of gastrin.

3767 CHANGES IN THE STRUCTURAL LOCALIZATION OF GLYCOGEN DURING GLUCOSE RESORPTION. (Ger.)

Varkonyi, T.; Wittmann, T.; Karacsony, G.; Varro, V. (I. Medizinische Universitatsklinik, H-6701 Szeged, Hungary). *Z. Gastroenterol.* 15(9):565-571; 1977.

To investigate quantitative changes in the glycogen granula contents of the small intestinal mucosa, the localization of glycogen in the jejunal wall was studied during glucose resorption in 10 fasting dogs with isolated jejunal loops using light microscopy with Best-carmine staining. Isotonic glucose solution was introduced into the jejunal lumen. Glycogen was detected in the form of red granules in a patchy arrangement in the supranuclear cytoplasmic region of the enterocytes during the initial phase of the glucose resorption. About 15 min after the beginning of resorption, glycogen also appeared in steadily increasing quantities in the lamina propria. The injection of glucagon (50-100 μg/15 min) into the artery of the intestinal loop during glucose resorption caused the total disappearance of glycogen from the enterocytes, but the glycogen load of the lamina propria cells remained unchanged. The findings indicate that the epithelial cells of the small intestine are the primary target of glucagon.

3768 THE DIGESTION AND TRANSMISSION OF LABELLED IMMUNOGLOBULIN G BY ENTEROCYTES OF THE PROXIMAL AND DISTAL REGIONS OF THE SMALL INTESTINE OF YOUNG RATS. (Eng.)

Morris, B.; Morris, R. (Dept. Zoology, Univ. Nottingham, University Park, Nottingham NG7 2RD, England). *J. Physiol. (Lond.)* 273(2):427-442; 1977.

The breakdown products produced by the digestive activities of the proximal and distal regions of the small intestine of suckling Wistar rats were investigated to provide information on the functional differences between proximal and distal enterocytes. Density gradient centrifugation of samples prepared from proximal gut homogenates after intralumenal injection of ^{125}I-labeled IgG was used to prepare batches of IgG fragments according to sedimentation coefficients. The radioactivity in the vascular compartments, viscera, and carcasses of rats aged 14-15 days, was partitioned using ultrafiltration 2 hr after the injection of labeled IgG into the proximal and distal regions of the small intestine. Radioactive samples prepared by these methods were reintroduced into young rats by intracardiac injection, and the rate at which they were removed from the vascular compartment was assessed. Proximal enterocytes transmitted about 39% of the IgG that had been removed from the intestine in intact form. Most of this was retained in the vascular compartment; they degraded up to about 57% of the total removed into fragments less than 1,000 in molecular weight and about 4% into intermediate-sized fragments. Distal enterocytes degraded almost 90% of the IgG processed into fragments less than 1,000 in molecular weight, and about 8% into fragments greater than 100,000 in molecular weight. Fragments of all sizes were cleared rapidly from the circulation into the viscera and carcass. The results show that, even in the absence of peptic digestion, the proximal and distal enterocytes contain efficient mechanisms for digesting protein.

3769 IMMUNOCYTOCHEMICAL AND HISTOCHEMICAL STUDIES ON INTESTINAL EPITHELIAL CELLS PRODUCING BOTH LYSOZYME AND MUCOSUBSTANCE. (Eng.)

Montero, C.; Erlandsen, L. (Dept. Anatomy, Univ. Minnesota, Minneapolis, MN 55455). *Anat. Rec.* 190 (1):127-142; 1978.

The existence of lysozyme mucus-producing cells was investigated in both the rat and human intestine. The simultaneous demonstration of lysozyme (using the unlabeled antibody enzyme method) and mucosubstances (by staining with the PAS and Alcian Blue pH 2.5 techniques) led to the identification of a new subpopulation of mucus-producing cells containing lysozyme in small intestinal specimens from normal rats and from patients with inflammatory bowel diseases. These cells, containing both mucosubstances and lysozyme, were located in the lateral walls of the crypts of Lieberkuhn, but were occasionally found also in or near the tips of the villi. The specific staining for lysozyme was observed in the apical and/or basal cytoplasm of these mucus-producing cells and was readily detected in sections counterstained for mucosubstances with Alcian Blue. The localization of these mucus-producing cells was similar both in the normal rat and in the pathological human specimens. Absorption controls and controls where a nonimmune serum was substituted for the specific antilysozyme serum confirmed the specificity of the lysozyme localization.

3770 NUCLEIC ACID AND PROTEIN CONTENT OF RAT CECUM MUCOSA IN DIETARY ADAPTATION-GROWTH BY CELLULAR HYPERPLASIA. (Eng.)

Loeschke, K.; Resch, W. (Medizinische Klinik Innenstadt der Universitat Munchen, Ziemssenstrasse 1, D-8000 Munchen 2, W. Germany). *Pfluegers Arch.* 372(1):91-94; 1977.

DNA, RNA, and protein content of the isolated cecum mucosa was determined in control rats and rats with adaptive cecum growth induced by dietary polyethylene glycol (administered in drinking water at 160 g/l). Feeding the polymer resulted in an increase in the total amount of mucosal nucleic acids and protein that was statistically significant after 2-4 days and reached twice the control value after 2 months. During growth, the protein/DNA, protein/RNA, and RNA/DNA ratios remained unaltered, indicating hyperplasia and not hypertrophy of the epithelial cells. The water content of the mucosa increased from 75% to 81% during adaptation, possibly related to the stimulation in active sodium transport reported earlier. Recalculation of parallel Na-K-ATPase data on the basis of DNA content demonstrated a doubling of Na-K-ATPase activity per mg DNA in the fully adapted cell.

3771 SITE OF INTESTINAL DIPEPTIDE HYDROLYSIS.

(Eng.) Wiseman, G. (Physiology Dept., The Univ., Western Bank, Sheffield S10 2TN, England). *J. Physiol. (Lond.)* 273(3):731-743; 1977.

The effects of 12 dipeptides and their free amino acids on the active transport of D-glucose across the mucosa of sacs of everted hamster small intestine were studied to determine the cellular site of final hydrolysis of the dipeptides. All dipeptides had a partially inhibitory effect on the active transport of D-glucose (5.55 mM) when present at initial concentrations of 5 mM (except prolylglycine, which had an inhibitory action at a 10 mM initial concentration). Marked inhibition occurred with glycyl-L-alanine, L-alanyl-L-alanine, and L-leucyl-L-alanine, all of which reduced the final D-glucose concentration ratio to about 60% of control values. Experiments that compared the effectiveness of each dipeptide with the effectiveness of its constituent free amino acids in suppressing D-glucose active transport permitted the classification of the dipeptides into two categories. Class 1 dipeptides (L-alanyl-glycine, glycyl-glycine, L-valyl-L-valine, L-alanyl-L-valine, L-valyl-L-alanine, and L-prolylglycine) were either more effective or less effective than their component amino acids at identical concentrations. It is suggested that these dipeptides are hydrolyzed beyond the locus of the active transport mechanism for D-glucose (i.e., the brush border or outer cell surface) and they are designated deep dipeptides; their locus of hydrolysis is perhaps within the cell. In contrast, L-alanyl-L-alanine, L-leucyl-L-leucine, glycyl-L-alanine, L-alanyl-L-leucine, L-leucyl-L-alanine, and glycyl-L-proline were only as effective in suppressing D-glucose active transport as equimolar amounts of their respective amino acids. The locus of hydrolysis of these six dipeptides is suggested to be superficial to the locus of the D-glucose active transport mechanism (i.e., that both events occur near the surface). These latter dipeptides are designated as class 2, superficial dipeptides. Since all the dipeptides partially inhibited D-glucose active transport, more than one mechanism for active sugar absorption may exist; further studies are needed to investigate these questions.

3772 CHARACTERISTICS OF POTASSIUM SECRETION IN THE MAMMALIAN COLON.

(Eng.) Bastl, C.; Kliger, A. S.; Binder, H. J.; Hayslett, J. P. (Yale Univ. Sch. Medicine, New Haven, CT 06510). *Am. J. Physiol.* 234(1):F48-F53; 1978.

The characteristics of potassium transport in the colon were analyzed by determining the forces governing potassium movement, the influence of flow rate on net movement, and the response to acute and chronic changes in potassium balance in Sprague-Dawley rats. There was no evidence for active potassium transport since, under steady-state conditions, the secretion occurs down an observed electrochemical gradient that was not statistically different from the predicted value. The secretion rate rose promptly in response to acute hyperkalemia and fell to zero net movement in chronic potassium deficiency. In contrast to the renal distal tubule, potassium secretion in the colon is not flow dependent. In further experiments designed to examine overall transport characteristics in the colon, sodium was shown to be absorbed against an electrochemical gradient of approximately 60 mV, and water permeability and sodium transport in the colon was not increased by vasopressin. The rate of sodium absorption in the colon, unlike the distal tubule, is not flow dependent.

3773 ENDOGENOUS ACID RELEASES SECRETIN IN MAN.

(Eng.) Domschke, W.; Greenberg, G. R.; Domschke, S.; Bloom, S. R.; Mitznegg, P.; Sprugel, W.; *et al.* (Dept. Medicine, Univ. Erlangen-Nurnberg, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):362-363; 1977.

The effect of gastric acid secretion on secretin release was investigated in six healthy volunteers. Pentagastrin (1.5 µg/kg/hr i.v.) was administered with and without aspiration of gastric contents, and plasma secretin was estimated by radioimmunoassay. Pentagastrin administration with continuous aspiration produced no change in plasma secretin immunoreactivity. Pentagastrin administration without aspiration of gastric juice resulted in a steadily increasing plasma secretin level, which was significantly elevated ($p<0.05$) at the end of 60 min of pentagastrin infusion and also in the postinfusion hour. These results are compatible with the concept that the delivery of endogenous acid from the stomach to the duodenum contributes to secretin release, which in turn may serve as a physiological stimulus for pancreatic bicarbonate secretion.

3774 VITAMIN B_{12} PRODUCTION BY THE GASTROINTESTINAL MICROFLORA OF BABOONS FED EITHER VITAMIN B_{12} DEFICIENT DIET OR A DIET SUPPLEMENTED WITH VITAMIN B_{12}.

(Eng.) Uphill, P. F.; Jacob, F.; Lall, P. (Nuffield Inst. Comparative Medicine, Regent's Park, London NW1 4RY, England). *J. Appl. Bacteriol.* 43(3):333-344; 1977.

To determine whether the intestinal flora play a part in vitamin B_{12} nutrition in the baboon, the vitamin B_{12}-producing capacity of microorganisms isolated from baboon feces and gastric contents was measured using *Lactobacillus leichmannii*. The animals were fed either a diet deficient in or supplemented with (controls) vitamin B_{12}. Samples of gastric and small intestinal contents, obtained at laparotomy from two young vitamin B_{12}-deprived baboons, contained varying quantities of vitamin B_{12}. Many of the organisms isolated from these aspirates produced vitamin B_{12} *in vitro*. The highest levels of vitamin B_{12} were produced by anaerobic organisms. Gastric juice samples from vitamin B_{12}-deprived and control baboons contained similar types of organisms with similar vitamin B_{12}-producing capacity. The vitamin B_{12} content, pH, and total bacterial counts of gastric juice samples aspirated after a 6-hr fast from vitamin B_{12}-deprived baboons were not significantly different from those of the control animals. The pH values of gastric juice samples aspirated 18 hr after feeding, however, were significantly lower ($p<0.001$) than those of 6-hr fasting samples in both groups. The B_{12} content in gastric juice aspirated 18 hr after feeding was significantly greater ($p<0.001$) only in the B_{12}-deprived animals. The mean vitamin B_{12} levels in the total volumes of gastric juice aspirated after each fasting period were similar. The results suggest that gastrointestinal flora are involved in the vitamin B_{12} status of the baboon.

3775 EXPERIMENTAL CLINDAMYCIN-ASSOCIATED COLITIS IN RABBITS: EVIDENCE FOR TOXIN-MEDIATED MUCOSAL DAMAGE. (Eng.) Katz, L.; LaMont, J. T.; Trier, J. S.; Sonnenblick, E. B.; Rothman, S. W.; Broitman, S. A.; *et al.* (Harvard Medical Sch., Boston, MA). *Gastroenterology* 74(2, Part 1): 246-252; 1978.

To study clindamycin colitis under controlled laboratory conditions, severe enterocolitis was produced in rabbits by the p.o. administration of clindamycin in doses comparable to those used in humans. Rabbits given clindamycin (15 mg/kg/day) by nasogastric tube developed diarrhea within 48 to 72 hr that was uniformly fatal by 72 to 96 hr. Controls given comparable doses of ampicillin, tetracycline, neomycin, vancomycin, or saline remained well. At autopsy, the major gross pathological finding was limited to the cecum, which was massively dilated with watery stool. The light microscopic findings in the cecum included necrosis of the surface epithelium and a prominent inflammatory infiltrate in the lamina propria. Fatal clindamycin colitis was prevented in all of 10 tested rabbits by co-administration of vancomycin (30 mg/kg/day); co-administration of penicillin or neomycin prevented the ileocolitis in 3 of 5 and 1 of 5 animals, resp. Cell proliferation, measured by radioautography after $[^3H]$thymidine injection, was significantly increased in cecal mucosa but not in the more distal colonic or small intestinal mucosa during clindamycin administration. Protein synthesis, as determined by incorporation of $[^3H]$leucine into intestinal slices, was significantly increased in both the ileum and cecum after 48 hr of clindamycin administration. Cell-free, sterile extracts of cecal contents of clindamycin-treated animals were injected into ileal loops of untreated rabbits. These fecal extracts produced a severe, hemorrhagic ileitis, although control filtrates from clindamycin-vancomycin-treated animals produced no histological changes. Using selective anaerobic culture media, there was an increase in clostridial species after 48 hr of clindamycin treatment (from 10^5 organisms/g of cecal content in controls to 10^8/g) and a reduction in clindamycin-vancomycin-treated animals (to 10^4 organisms/g). The pathogenesis of clindamycin-associated colitis in rabbits appears to be mediated by a bacterial toxin present in the cecal contents.

3776 ELIMINATION OF SECRETIN [Abstract]. (Eng.) Fahrenkrug, J.; Schaffalitzky de Muckadell, O. B.; Holst, J. J. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):19; 1977.

3777 DIFFERENT MECHANISMS OF ACTION OF VASOACTIVE INTESTINAL POLYPEPTIDE (VIP) AND GLUCAGON ON INTESTINAL SECRETION [Letter to Editor]. (Eng.) Mailman, D. (Biology Dept., Univ. Houston, Houston, TX 77004). *Gastroenterology* 73(6):1463-1465; 1977.

3778 CHARACTERIZATION OF SECRETIN-LIKE PEPTIDES FROM TISSUE AND PLASMA EXTRACTS USING IMMUNOAFFINITY CHROMATOGRAPHY [Abstract]. (Eng.) Mason, J. C.; Murphy, R. F.; Buchanan, K. D. (Dept. Biochemistry, Queen's Univ., Belfast, Northern Ireland). *Gut* 18(11):A982-A983; 1977.

3779 SUBCELLULAR DISTRIBUTION OF DI-, TRI-, TETRA- AND PENTA-PEPTIDASE IN HUMAN JEJUNUM [Abstract]. (Eng.) Nicholson, J. A.; Peters, T. J. (Royal Postgraduate Medical Sch., London, England). 18(11):A960-A961; 1977.

3780 ISOLATION AND CHARACTERIZATION OF POLYPEPTIDE HORMONE STORAGE GRANULES FROM HUMAN JEJUNUM [Abstract]. (Eng.) Bryant, M. G.; Bloom, S. R.; Jones, P. E.; Peters, T. J. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(11):A961; 1977.

3781 IDENTIFICATION OF STEM CELLS IN THE RAT AND HUMAN INTESTINAL MUCOSA [Abstract]. (Eng.) Wright, N. A.; Al-Dewachi, H.; Appleton, D. R.; Watson, A. J. (Dept. Pathology, Univ. Newcastle upon Tyne, England). *Gut* 18(11):A967; 1977.

3782 MECHANISM OF ACTION OF PREDNISOLONE ON THE ABSORPTIVE-DIGESTIVE FUNCTIONS OF THE RAT SMALL INTESTINE [Abstract]. (Eng.) Scott, J.; Batt, R. M.; Peters, T. J. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(11):A967; 1977.

SECRETION AND METABOLISM

3783 CONTRIBUTION TO EARLY DEVELOPMENT OF THE SMALL INTESTINE IN THE HUMAN EMBRYO. (Eng.) Pospisilova, V.; Terstianska, G.; Vranakova, V. (Faculty Medicine, Comenius Univ., Bratislava, Czechoslovakia). *Fol. Morphol. (Praha)* 25(4):333-337; 1977.

3784 NUTRITIVE EFFECTS OF FOOD CONSTITUENTS ON THE STRUCTURE AND FUNCTION OF THE INTESTINE. (Eng.) Riecken, E. O.; Menge, H. (Medizinische Universitatsklinik, D-3550 Marburg/Lahn, Marburg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):389-399; 1977.

3785 SECONDARY EFFECTS OF AGANGLIONOSIS IN THE PIEBALD-LETHAL MOUSE MODEL OF HIRSCHSPRUNG'S DISEASE. (Eng.) Brann, L.; Furtado, D.; Migliazzo, C. V.; Baxendale, J.; Wood, J. D. (Univ. Kansas Medical Center, Kansas City, KS 66103). *J. Lab. Anim. Sci.* 27(6):946-954; 1977.

3786 SECRETION OF MONOQUATERNARY AMMONIUM COMPOUNDS BY GUINEA PIG SMALL INTESTINE IN VIVO. (Eng.) Turnheim, K.; Lauterbach, F. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Naunyn Schmiedebergs Arch. Pharmacol.* 299(3):201-205; 1977.

3787 POSSIBLE ROLE OF SUCCUS ENTERICUS IN AMINO ACID HOMEOSTASIS IN THE DOG. (Eng.) Nasset, E. S. (Children's Hosp. Medical Center of Northern California, 51st and Grove St., Oakland, CA 94609). *Digestion* 16(1/2):108-117; 1977.

3788 ASSOCIATION OF SOME ENTEROBACTERIA WITH THE INTESTINAL MUCOSA OF MOUSE IN RELATION TO THEIR PARTITION IN AQUEOUS POLYMER TWO-PHASE SYSTEMS. (Eng.) Perers, L.; Andaker, L.; Edebo, L.; Stendahl, O.; Tagesson, C. (Dept. Medical Microbiology, Univ. Linkoping, S-581 85 Linkoping, Sweden). *Acta Pathol. Microbiol. Scand.* [*B*] 85(5):308-316; 1977.

3789 THE COLONIZATION OF THE HUMAN GUT BY ANTIBIOTIC RESISTANT Escherichia coli FROM CHICKENS. (Eng.) Linton, A. H.; Howe, K.; Bennett, P. M.; Richmond, M. H.; Whiteside, E. J. (Medical Sch., Univ. Bristol, Bristol BS8 1TD, England). *J. Appl. Bacteriol.* 43(3):465-469; 1977.

See also, 3484, 3486, 3541, 3542, 3548, 3559, 3560, 3561, 3567, 3621, 3792, 3794, 3796, 3807, 3810, 3812, 3816, 3819, 3822, 3828, 3835, 3966, 4033, 4262.

GENERAL

3790 THE MECHANISM OF THE CHANGES IN SPLANCHNIC BLOOD FLOW AFTER FEEDING. (Eng.) Benyo, I.; Sandor, J.; Szabo, G. (Semmelweis Univ. Medical Sch., Mezo Imre ut 17, H-1430, Budapest, Hungary). *Res. Exp. Med.* 171(3):255-261; 1977.

The mechanism of the transitory increase in splanchnic blood flow after feeding was studied in dogs. The introduction of hydrolyzed protein solution into the duodenum increased hepatic artery flow by 5.6 ± 3.3% ($p>0.05$) and portal venous flow by 13.6 ± 3.6% ($p<0.05$). Total hepatic blood flow increased 26.4 ± 3.3% ($p<0.001$). The reaction was smaller than after the introduction of 0.1 N HCl (17.9 ± 2.8% increase in hepatic artery flow and 32.3 ± 4.3%, $p<0.001$ increase in portal venous flow). Total hepatic blood flow increased 11.3 ± 2.3% ($p<0.01$-0.05). The introduction of a 30% glucose solution had no effect on splanchnic circulation. Splanchnicotomy combined with celiac ganglion denervation as well as the blockade of the sympathetic alpha receptors abolished the circulatory reaction to intraduodenal acid administration. Both interventions led, however, to a decrease in splanchnic vascular resistance similar to that observed after intraduodenal introduction of acid in normal dogs. It is concluded that the circulatory reaction occurring after the acidification of the duodenal contents after feeding is due to the reduction or abolition of the sympathetic vasomotor tone in the splanchnic vascular bed.

3791 MICROCIRCULATION STUDIES OF THE VILLUS OF THE SMALL INTESTINE OF THE RAT IN VIVO. (Ger.) Knoblauch, M.; Holliger, Ch. (Medizinische Klinik, Kantonsspital, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 107(40): 1391-1399; 1977.

A method of studying the microcirculation in the jejunal villus of the living rat is described. The method used is based on the trans illumination of the exposed mucosa, and it permits the measurement of the velocity of plasma gaps and of the diameter of various vessels. The motility of the gut is overcome by allowing the intestine to adhere to the water immersion lens. The animals were fed *N*-acetyl-L-cysteine to prevent mucus production. A direct arteriovenous connection between the arterioles and the venous system of the villus is postulated. The plasma gap velocity was 1.78 ± 0.62 mm/sec in the arterioles and 0.42 ± 0.08 mm/sec in the capillaries. The measured diameter of the erythrocyte column in the vessels was 9.14 ± 1.89 μm in the central artery, 5.88 ± 1.05 μm in the proximal third of the arcade arteriole, 6.69 ± 1.04 µm in the middle third, 8.86 ± 1.63 µm in the distal third of the arcade arteriole, 4.56 ± 0.57 µm in the capillaries, and 13.58 ± 2.67 µm in the venules. The method also allows the puncture of villus vessels.

3792 EFFECT OF HYPEROSMOLALITY ON VASCULAR RESISTANCE AND LYMPH FLOW IN THE CAT ILEUM.

(Eng.) Levine, S. E.; Granger, D. N.; Brace, R. A.; Taylor, A. E. (Univ. Mississippi Medical Center, Jackson, MS 39216). *Am. J. Physiol.* 234(1):H14-H20; 1978.

To determine the effects of locally infused hyperosmotic solutions of glucose, urea, and sodium chloride on intestinal hemodynamics and tissue hydration, systemic arterial pressure, superior mesenteric arterial and venous pressures, blood flow, lymph flow, and intestinal volume were monitored continuously from an autoperfused loop of cat ileum. The solutes were infused into the superior mesenteric artery at varying rates (0.20-0.80 ml/min) and concentrations (300-1,500 mOsm/kg). Infusion of iso-osmotic solutions of either NaCl or glucose did not significantly alter vascular resistance, tissue volume, or lymph flow. A consistent effect of iso- or hyperosmotic urea infusions was not demonstrated. Hyperosmotic glucose and NaCl infusions both caused marked reductions in vascular resistance; however, the magnitude and time course of the response differed between solutes. Glucose was shown to produce a 2.70% decrease in vascular resistance per 1% increase in plasma osmolality. The resistance responses to hyperosmotic glucose were maintained throughout the infusion period. NaCl infusions produced a 4.87% decrease in vascular resistance for each 1% increase in plasma osmolality. In addition, the NaCl infusions produced a fall in resistance, which waned with time. The osmolality increase induced by the infusion of either solute caused significant reductions in both tissue volume and lymph flow; however, the magnitude of the changes in lymph flow were not correlated to the change in either plasma osmolality or tissue volume. The results suggest that the ileal vasculature may respond more vigorously to osmolality changes than do other regional circulations.

3793 COLONIC RESPONSE TO DIETARY FIBRE FROM CARROT, CABBAGE, APPLE, BRAN, AND GUAR GUM.

(Eng.) Cummings, J. H.; Branch, W.; Jenkins, D. J. A.; Southgate, D. A. T.; Houston, H.; James, W. P. T. (Dunn Nutrition Unit, Milton Rd., Cambridge, England). *Lancet* 1(8054):5-8; 1978.

The effects of dietary fiber from different food sources were investigated in 19 healthy men. Approximately 20 g/day of concentrated dietary fiber from either carrot, cabbage, apple, bran, or guar gum was added to the controlled basal diet for 3 weeks. The subjects received no fiber during a second 3-week period. Six subjects took fiber from more than one source. Fecal weight increased by 127% on bran, 69% on cabbage, 59% on carrot, 40% on apple, and 20% on guar gum. These changes in fecal weight were correlated with an increased intake of pentose-containing polysaccharides from the fiber. On the basal diet, there were pronounced individual differences in fecal weight, and from these the response of subjects to the fiber preparations could be predicted. Addition of fiber shortened mean transit time through the gut and significantly diluted an inert marker in the feces. Diet-induced changes in colonic function may explain international differences in the prevalence of colonic disease, while personal variation in the response to dietary fiber may determine individual susceptibility to large bowel disease within a community.

3794 ENDOTOXEMIA AND LARGE INTESTINAL BLOOD FLOW IN SUBHUMAN PRIMATES.

(Eng.) Swan, K. G.; Trout, H. H., III; Reynolds, D. G. (New Jersey Medical Sch., 100 Bergen St., Newark, NJ 07103). *Circ. Shock* 4(4):369-377; 1977.

The hemodynamic effects of *Escherichia coli* endotoxin (LD_{80}) were measured in the large intestine of anesthetized Rhesus monkeys to determine whether this organ contributes to the pathogenesis of experimental shock. Inferior mesenteric arterial blood flow (IMF) was measured with an electromagnetic flow meter. Colonic blood flow distribution was measured with radioactive microspheres: Ce, Sr, and Cr were injected into the left heart. Reference blood samples were obtained from a femoral artery. The mean control IMF was 22.9 ± 2.2 ml/min. The aortic pressure was 113 ± 11 mm Hg, and portal venous pressure was 6 ± 1 mm Hg. Arterial blood pH was 7.43 ± 0.02; pO_2 and pCO_2 were 93.4 and 37.1 mm Hg, resp. All parameters were measured at hourly intervals for 4 hr. Neither IMF nor its distribution within the colon changed during the entire observation period. Aortic pressure fell to a low of 60 ± 6 mm Hg ($p<0.02$) at 3 hr; portal venous pressure, pO_2 and pCO_2 were unchanged by endotoxin. Arterial blood pH fell to 7.315 ± 0.020 at 4 hr ($p<0.01$). These observations indicate that the colon is not a "target organ" of endotoxic shock in subhuman primates, despite considerable hypotension and metabolic disturbances subsequent to near lethal endotoxemia.

3795 AN EVALUATION OF THE FUNCTION OF A BIOLOGICAL ESOPHAGEAL TRANSPLANT.

(Eng.) Jakobsen, M. K.; Schroder, H.; Mouritzen, C. (Aarhus Kommunehosp., 8000 Aarhus C, Denmark). *Eur. Surg. Res.* 9(2):397-398; 1977.

3796 THE ROLE OF THE INTESTINAL MICROFLORA IN EXPERIMENTAL COLITIS.

(Eng.) Onderdonk, A. B.; Hermos, J. A.; Bartlett, J. G. (Boston Veterans Admin. Hosp., Boston, MA). *Am. J. Clin. Nutr.* 30(11):1819-1825; 1977.

3797 TISSUE DISTRIBUTION OF RADIOACTIVITY IN RATS GIVEN TRITIATED ANALOGUES OF HEPATOTOXIC PYRROLIZIDINE ALKALOIDS.

(Eng.) Mattocks, A.

R. (Medical Res. Council Lab., Woodmansterne Rd., Carshalton, Surrey, England). *Xenobiotica* 7(11): 665-670; 1977.

3798 A PROFILE OF THE GASTROINTESTINAL TOXICITY OF ASPIRIN, INDOMETHACIN, OXAPROZIN, PHENYLBUTAZONE, AND FENTIAZAC IN ARTHRITIC AND LEWIS NORMAL RATS. (Eng.) Shriver, D. A.; Dove, P. A.; White, C. B.; Sandor, A.; Rosenthale, M. E. (Ortho Pharmaceutical Corp., Raritan, NJ 08869). *Toxicol. Appl. Pharmacol.* 42(1):75-83; 1977.

3799 SOME COPPER COORDINATION COMPOUNDS AND THEIR ANTIINFLAMMATORY AND ANTIULCER ACTIVITIES. (Eng.) Sorenson, J. R. J. (G.D. Searle and Co., Chicago, IL). *Inflammation* 1(3): 317-331; 1976.

3800 EVIDENCE FOR IMMUNE EXCLUSION AFTER IN VIVO ANTIGEN INFUSION INTO THE GASTROINTESTINAL TRACT [Abstract]. (Eng.) Walker, W. A.; Bloch, K. J. (Massachusetts General Hosp., Boston, MA 02114). *Gastroenterology* 72(5, Part 2):1185; 1977.

3801 THE NEURONAL RELATIONSHIPS BETWEEN THE CELIAC PLEXUS AND THE GASTROINTESTINAL TRACT [Abstract]. (Eng.) Kreulen, D. L.; Szurszewski, J. H. (Mayo Medical Sch., Rochester, MN 55901). *Gastroenterology* 72(5, Part 2):1084; 1977.

3802 MESENTERIC VASODILATION MEDIATED BY BOTH H_1- AND H_2- RECEPTORS TO HISTAMINE [Abstract]. (Eng.) Miller, T.A.; Tepperman, B. L.; Tague, L. L.; Pawlik, W.; Jacobson, E. D. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2):1102; 1977.

3803 STUDIES ON HUMAN PANCREATIC ELASTASE IN BLOOD [Abstract]. (Eng.) Geokas, M. C.; Largman, C.; Brodrick, J. W. (Martinez Veterans Admin. Hosp., Martinez, CA). *Gastroenterology* 72 (5, Part 2):1061; 1977.

3804 DOES REDUCTION OF BRAIN NOREPINEPHRINE (OR DOPAMINE) CAUSE COMA [Abstract]? (Eng.) Zieve, L.; Olsen, R. L. (Veterans Admin. Hosp., Minneapolis, MN). *Gastroenterology* 72(5, Part 2):1154; 1977.

3805 INTRAPERITONEAL TOBRAMYCIN IN EXPERIMENTAL PERITONITIS [Abstract]. (Eng.) Marks, M.; Fitzgibbons, R.; Potin, D. H.; Nance, F. C. (Louisiana State Univ. Medical Center, New Orleans, LA). *Gastroenterology* 72(5, Part 2):1098; 1977.

3806 EFFECT OF ZINC DEFICIENCY ON SUBMANDIBULAR GLAND IN THE RAT [Abstract]. (Eng.) Iqbal, M.; Meyer, J.; Gerson, S. J. (Dept. Oral Pathology, Univ. Illinois, Chicago, IL). *J. Dent. Res.* 56(B):B112; 1977.

3807 MAINTENANCE OF RAT SMALL INTESTINAL VILLUS AND CRYPT CELLS IN CULTURE [Abstract]. (Eng.) Hoffman, A. G. D.; Kuksis, A. (Banting & Best Dept. Medical Res., Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2): 1160; 1977.

3808 A. COLI TRANSVERSI S. ACCESSORY MIDDLE COLIC ARTERY [Abstract]. (Eng.) Ilic, A.; Blagotic, M.; Draganic, V. (Inst. Anatomy, Belgrade, Yugoslavia). *Acta Anat. (Basel)* 99(1):96; 1977.

3809 ROLE OF GUT BACTERIAL FLORA IN NUTRITION AND HEALTH: A REVIEW OF RECENT ADVANCES IN BACTERIOLOGICAL TECHNIQUES, METABOLISM, AND FACTORS AFFECTING FLORA COMPOSITION. (Eng.) Brown, J. P. (Dept. Biological Sciences, Dynapol, Palo Alto, CA). *C.R.C. Crit. Rev. Food Sci. Nutr.* 8(3): 229-336; 1977.

3810 IS CEA A NORMAL COLONIC GLYCOPROTEIN [Abstract]? (Eng.) Go, V. L. W.; Todd, C. W.; Egan, M. L. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 72(5, Part 2):1063; 1977.

3811 THE EFFECT OF DIETARY FIBER ON STOOL BULK AND GUT TRANSIT TIME [Abstract]. (Eng.) Devereux, D. F.; Baker, A. R. (Natl. Cancer Inst., Bethesda, MD 20014). *Gastroenterology* 72(5, Part 2):1048; 1977.

3812 A SEVERE NECROTIC ENTEROTOXIN PRODUCED BY CERTAIN FOOD, FOOD POISONING AND OTHER CLINICAL ISOLATES OF Bacillus cereus. (Eng.) Turnbull, P. C. B.; Nottingham, J. F.; Ghosh, A. C. (Food Hygiene Lab., Central Public Health Lab., Colindale Ave., London, England). *Br. J. Exp. Pathol.* 58(3):273-280; 1977.

3813 DIETARY LECTINS: IDENTIFICATION IN FECAL SAMPLES [Abstract]. (Eng.) Vannier, A. M. (Dept. Medicine, Univ. Kentucky, Lexington, KY). *Gastroenterology* 72(5, Part 2):1190; 1977.

3814 RESISTANCE OF GERMFREE ANIMALS TO INTESTINAL LESIONS PRODUCED BY INDOMETHACIN [Abstract]. (Eng.) Robert, A.; Asano, T. (Dept. Experimental Biology, Upjohn Co., Kalamazoo, MI). *Gastroenterology* 72(5, Part 2):1120; 1977.

3815 IgM ANTI-BOVINE SERUM ALBUMIN PRODUCTION AFTER ORAL IMMUNIZATION IN RABBITS [Abstract]. (Eng.) Lustig, J. V.; Rieger, C. H. L.; Kraft, S. C.; Rothberg, R. M. (Dept. Pediatrics, Univ. Chicago, Chicago, IL). *Gastroenterology* 72(5, Part 2):1091; 1977.

3816 DEPOSITION OF CIRCULATING IMMUNE-COMPLEXES IN THE INTESTINE OF RABBITS WITH CHRONIC SERUM SICKNESS, INDUCED BY HIGH DOSES OF ANTIGEN [Abstract]. (Eng.) Accinni, L.; Brentjens, J.; Albini, B.; Ossi, E.; O'Connell, D.; Andres, G. (Dept. Microbiology, State Univ. New York, Buffalo, NY 14214). *Gastroenterology* 72(5, Part 2):1024; 1977.

3817 THE SPECTRUM OF GROSS AND MICROSCOPIC FINDINGS IN THE HAMSTER MODEL OF ANTIBIOTIC-ASSOCIATED COLITIS [Abstract]. (Eng.) Humphrey, C. D.; Pittman, F. E.; Pittman, J. C. (Veterans Admin. Hosp., Charleston, SC). *Gastroenterology* 72(5, Part 2):1073; 1977.

3818 A GENETICALLY PREDETERMINED MOUSE MODEL FOR THE TRANSMISSION OF CROHN'S DISEASE [Abstract]. (Eng.) Cohen, Z.; Cook, M. G.; Festenstein, H. (London Hosp. Medical Coll., London, England). *Gastroenterology* 72(5, Part 2):1040; 1977.

3819 STRUCTURAL AND FUNCTIONAL STUDIES ON THE TRANSFORMATION OF THE INTESTINAL MUCOSA IN RATS WITH EXPERIMENTAL DIABETES. (Eng.) Lorenz-Meyer, H.; Thiel, F.; Menge, H.; Gottesburen, H.; Riecken, E. O. (Medizinische Universitatsklinik, D-3550 Marburg/Lahn, W. Germany). *Res. Exp. Med.* 170(2):89-99; 1977.

3820 CHOLESTEROL LOWERING MECHANISM DUE TO INTESTINAL BYPASS IN RAT [Abstract]. (Eng.) David, J. S. K.; Reichle, F. A.; Golsorkhi, M. (Temple Univ. Health Science Center, Philadelphia, PA 19140). *Gastroenterology* 72(5, Part 2): 1043; 1977.

3821 INTESTINAL BYPASS. A COMPARISON BETWEEN TWO DIFFERENT BYPASS OPERATIONS AND RESECTION OF THE SMALL INTESTINE IN RATS. (Eng.) Viddal, K. O.; Nygaard, K. (Univ. Hosp., Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 12(4):465-472; 1977.

3822 SUBLETHAL DAMAGE IN CELLS OF THE MOUSE GUT AFTER MIXED TREATMENT WITH X RAYS AND FAST NEUTRONS. (Eng.) Hornsey, S.; Andreozzi, U.; Warren, P. R. (Hammersmith Hosp., London W12 OHS, England). *Br. J. Radiol.* 50(595):513-517; 1977.

3823 BIVARIANT EFFECTS OF PENTAGASTRIN ON Ki's OF THE STOMACH AND SMALL AND LARGE INTESTINES OF THE DOG [Abstract]. (Eng.) Dugas, M.; Wechsler, R. L. (Univ. Pittsburgh Medical Sch., Pittsburgh, PA). *Gastroenterology* 72(5, Part 2): 1053; 1977.

3824 EFFECT OF SOMATOSTATIN ON FUNDIC MUCOSAL CELL PROLIFERATION IN THE RAT [Abstract]. (Eng.) Lehy, T.; Dubrasquet, M.; Bonfils, S. (INSERM U-10, Hopital Bichat, 75877 Paris Cedex 18, France). *Gastroenterology* 72(5, Part 2):1162; 1977.

3825 MEASUREMENT OF GASTRIC MUCOSAL BLOOD FLOW IN MAN [Abstract]. (Eng.) Guth, P. H.; Baumann, H.; Grossman, M. I.; Aures, D.; Elashoff, J. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1066; 1977.

3826 EFFECT OF GASTRIC ACID INHIBITION BY METIAMIDE AND VAGOTOMY UPON MUCOSAL MICROCIRCULATION [Abstract]. (Eng.) Goldstone, J.; Patel, M. D.; Way, L. W. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1064; 1977.

3827 SCIRRHOUS EOSINOPHILIC GASTRITIS IN DOGS WITH GASTRIC ARTERITIS. (Eng.) Hayden, D. W.; Fleischman, R. W. (Coll. Veterinary Medicine, Univ. Minnesota, St. Paul, MN 55108). *Vet. Pathol.* 14(5):441-448; 1977.

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3829 COMPARISON OF GLUTATHIONE S-TRANSFERASE IN HUMAN LEUKOCYTES AND LIVER [Abstract]. (Eng.) Kaplowitz, N.; Kulhenkamp, J.; Graham, M.; Spina, C. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1161; 1977.

3830 FUNCTIONAL CAPABILITIES OF GUINEA PIG KUPFER CELLS [Abstract]. (Eng.) Rogoff, T. M.; Combes, B.; Lipsky, P. E. (Southwestern Medical Sch., Dallas, TX). *Gastroenterology* 72(5, Part 2):1184; 1977.

3831 STUDIES ON THE BINDING OF BILE ACIDS BY PLASMA PROTEINS [Abstract]. (Eng.) Kakis, G.; Yousef, I. M.; Fisher, M. M. (Dept. Medicine, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1178; 1977.

3832 MORPHOLOGIC STUDIES ON THE FATE OF EXPERIMENTAL MALLORY BODIES ('ALCOHOLIC HYALIN') AND THEIR RELATIONSHIP TO CONTRACTILE PROTEINS [Abstract]. (Eng.) Denk, H. (Univ. Vienna Sch. Medicine, Vienna, Austria). *Digestion* 14(5/6):475-476; 1977.

3833 INTRALIPID ASSOCIATED PROTEIN AFTER RAT PLASMA EXPOSURE [Abstract]. (Eng.) Robinson, S. F.; Quarfordt, S. H. (Duke Univ. Medical Center, Durham, NC). *Gastroenterology* 72(5, Part 2):1121; 1977.

3834 EFFECT OF PARTIAL GASTRIC DEVASCULARIZATION ON MUCOSAL BLOOD FLOW AND ACID SECRETION IN CATS [Abstract]. (Eng.) Varhaug, J. E.; Skarstein, A.; Soreide, O.; Svanes, K. (N-5016 Haukeland sykehus, Norway). *Eur. Surg. Res.* 9(Suppl. 1):144; 1977.

3835 RELATIONSHIP BETWEEN DIETARY TRYPTOPHAN (TP) CONTENT AND SEROTONIN (5-HT) LEVELS IN RAT GUT AND WHOLE BLOOD [Abstract]. (Eng.) Colmenares, J. L.; Wurtman, R. J. (Massachusetts Inst. Technology, Cambridge, MA 02139). *Fed. Proc.* 36(3):1020; 1977.

3836 A NEW IN-VIVO SEQUENTIAL TECHNIQUE FOR THE MEASUREMENT OF EFFECTIVE LIVER BLOOD FLOW IN SMALL ANIMALS [Abstract]. (Eng.) Fleming, J. S.; Karran, S. J.; Eagles, C. J.; Ackery, D. (Royal South Hants Hosp., Fanshawe St., Southampton, Hants, England). *Eur. Surg. Res.* 9(Suppl. 1):173-174; 1977.

3837 EFFECTS OF THE PRETREATMENT OF THE DONOR ON THE GVH REACTION INDUCED BY INTRAHEPATIC PEYER'S PATCHES IMPLANTATION IN THE RAT. [Abstract]. (Eng.) Vuitton, D.; Eloy, R.; Grenier, J. F. (U 61 Avenue Moliere, Strasbourg 67200, France). *Eur. Surg. Res.* 9(Suppl. 1):89; 1977.

3838 THE HEPATIC PORTAL OSMORECEPTION AND REGULATION OF WATER BALANCE IN DOGS [Abstract]. (Eng.) Kozlowski, S.; Chwałbińska-Moneta, J. (Medical Res. Center, Polish Acad. Sciences, 1, Jazgarzewska Str., 00-730 Warsaw, Poland). *Eur. Surg. Res.* 9(Suppl. 1):169; 1977.

3839 INHIBITION OF LYMPHOCYTE PROLIFERATION BY MURINE LIVER-SPECIFIC F ANTIGEN. (Eng.) Lane, D. P.; Silver, D. M. (Dept. Zoology, Univ. Coll., London, England). *Transplantation Proc.* 9(1):1063-1065; 1977.

See also, 3523, 3532, 3549, 3559, 3640, 3641, 3776.

DIAGNOSTIC PROCEDURES

3840 A CELLULOSE ACETATE MEMBRANE PRECIPITIN (CAP) TEST FOR AMOEBIASIS. (Eng.) Stamm, W. P.; Phillips, E. A. (17 Ennismore Gardens, London SW7 1AA, England). *Trans. R. Soc. Trop. Med. Hyg.* 71(6):490-492; 1977.

A simple precipitin test (CAP) using cellulose acetate membrane was devised and compared with the gel diffusion precipitin (GDP) test in 251 sera tested by both methods. The CAP was never negative when the GDP was positive (110 sera). Thirty-four were negative by the GDP but positive by the CAP; in all of these, the patients either had active amebiasis or had a past history of amebiasis. The CAP is technically very simple, and the result is available within 4.5 hr. In addition, the membranes can be impregnated with antigen and stored for several months. The CAP is slightly more sensitive than the GDP and remains positive longer after the patient has been cured; it appears to be equally specific.

3841 CLINICAL EVALUATION OF THE (^{14}C)CHOLYLGLYCINE BREATH TEST. (Eng.) Thaysen, E. H.; Pedersen, L. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting held at the Hilton Hotel, Basel, Switzerland, October 11-12, 1976.* (Baltimore, MD: University Park Press): 263-269; 1977.

The [^{14}C]cholylglycine breath test was compared with the assay combining breath and stool ^{14}C measurements to assess its value in clinical gastroenterology as a measure of increased bile acid deconjugation resulting from either small gut bacterial overgrowth or bile acid malabsorption (excess bile acid loss into the colon). Intestinal bacterial bile acid deconjugation releases glycine whose labeled carboxyl atom is then oxidized to $^{14}CO_2$ and exhaled. Fecal ^{14}C determinations are made after complete combustion of the sample. While the breath test alone cannot discriminate between the small bowel syndrome and the syndrome of bile acid malabsorption, a positive breath test with a negative stool test suggests the former, whereas a positive stool test suggests the latter (the outcome of the breath test being unimportant). Of the 19 patients without gastrointestinal disease and 55 patients with functional diarrhea, only one control had a false-positive breath test and two had positive stool test. Of 68 patients with nonbile acid-related diarrhea, 8 had positive breath tests, and 6 had positive stool tests. Seven of the eight had disorders that could be accompanied by small gut bacterial overgrowth; three of the six also presented circumstantial evidence of involvement of terminal ileum. A positive breath test with a negative stool test was registered in 55 of 86 patients with contaminated small bowel syndrome. Positive stool tests were found in 15 of 16 patients with terminal ileal resections of at least 15 cm and in 31 of 34 patients with terminal ileitis; the breath tests were positive in 8/16 and 14/34, resp. The (^{14}C) cholylglycine breath test is inferior to the complete (^{14}C) cholylglycine assay. The complete (^{14}C)-cholylglycine assay, combining breath and stool ^{14}C measurements, is sensitive and specific, and provides satisfactory discrimination between the contaminated small bowel and bile acid malabsorption syndromes. The assay is superior to any other examination known in detecting terminal ileopathy.

3842 EVALUATION OF THE INDIRECT IMMUNOFLUORESCENCE AND COMPLEMENT FIXATION TESTS FOR THE SERODIAGNOSIS OF SCHISTOSOMIASIS. (Eng.) Wilson, M.; Fried, J.; McQuay, R. M.; Sulzer, A. J. (Center for Disease Control, Atlanta, GA 30333). *Am. J. Trop. Med. Hyg.* 26(6, Part 1):1159-1163; 1977.

Sera from 24 patients with *Schistosoma mansoni* infections, 24 with *S. hematobium*, 24 with *Ascaris* and other intestinal parasites, 22 with *Trichinella spiralis*, 24 with schistosome dermatitis, and 24 healthy subjects were used to compare the sensitivity and specificity of the complement fixation (CF) and the indirect immunofluorescence (IIF) tests for schistosomiasis. Adult antigens were used in both tests. The sensitivities of the IIF and CF tests were 95% and 69%, resp.; the specificities were 98% and 100%, resp. There was no statistical difference between the number of positive reactors among those individuals with no detectable helminth infection and those infected with helminths other than schistosomes. Infected people native to endemic areas had lower reactivity in both tests than did infected U.S. citizens who resided in endemic areas for only a few years. It is concluded that the IIF test with adult antigen is more sensitive than and as specific as the CF test; therefore, the IIF test is the procedure of choice for routine diagnostic serology of schistosomiasis.

3843 USE OF TOLONIUM CHLORIDE IN THE DIAGNOSIS OF MALIGNANT GASTRIC ULCERS. (Eng.) Giler S.; Kadish, U.; Urca, I. (Beilinson Medical Center, Petah Tikva, Israel). *Arch. Surg.* 113(2):136-139; 1978.

Peroral staining with tolonium chloride (toluidine blue) was carried out in 45 patients with suspected gastric ulcer disease in an evaluation of this method for the diagnosis of malignant gastric ulcers. During endoscopy, 19 of 21 malignant ulcers and 1 of 15 benign ulcers were stained. Following surgery, 18 of 21 malignant ulcers found in the surgical specimens were stained. Eleven patients with benign ulcers underwent surgery, and none of these ulcers were found to be stained in the surgical specimens. Normal gastric mucosa and areas of gastritis appeared unchanged. Tolonium chloride staining prior to endoscopy or surgery seems to be helpful in differentiating between minute benign and malignant gastric ulcers.

3844 INHIBITION BY CONCANAVALIN A AS THE BASIS FOR A SPECIFIC ASSAY OF SERUM 5'-NUCLEOTIDASE ACTIVITY. (Eng.) Zygowicz, E. R.; Sunderman, F. W., Jr.; Horak, E.; Dooley, J. F. (Univ.

Connecticut Sch. Medicine, Farmington, CT 06032). *Clin. Chem.* 23(12):2311-2323; 1977.

A new method for assaying serum 5'-nucleotidase activity, which is based on the ability of concanavalin A to inhibit the activity of this enzyme without causing significant inhibition of alkaline phosphatase activity, is described. The method depends upon the difference between the enzymic hydrolysis of adenosine-5'-monophosphate in the presence and absence of concanavalin A. Adenosine released by the 5'-nucleotidase reaction is deaminated by a coupled reaction with adenosine deaminase to liberate inosine and ammonia; the ammonia release was measured colorimetrically. In sera from 40 healthy subjects, 5'-nucleotidase activity averaged 6.4 U/l (± 2.0; range, 3-12). In sera from 100 patients, measurements of 5'-nucleotidase activity by the new assay averaged 8% lower than by a generally accepted method in which phenyl phosphate is used to suppress hydrolysis of adenosine-5'-monophosphate by alkaline phosphatase activity. The clinical validity of the new assay was tested by measuring serum 5'-nucleotidase activities in rats with bile duct ligation and in rats treated with thioacetamide to induce hepatocellular injury. Rats with liver injury had 5'-nucleotidase activities 1.4- to 1.5-fold greater than the nucleotidase activities in controls, and this activity increased to a greater extent in rats with acute biliary obstruction than in rats with acute toxic injury of hepatic parenchymal cells; these findings are consistent with the reports of previous workers who have used other assay methods. The advantages of the new method include: excellent sensitivity and precision; freedom from interference by bilirubin, lipemia, ammonia, and hemoglobin; and low susceptibility to interference by erythrocyte 5'-nucleotidase activity. The method has two disadvantages: it is relatively time-consuming and it is not readily adaptable to automation.

3845 CONTRIBUTION OF ARTERIOGRAPHY TO THE DIAGNOSIS OF LIVER ABSCESS: OBSERVATION OF 20 CASES. (Fre.) Mandoul, M.; Joffre, F.; Carcy, J. B.; Vidal, J. L. (Service Central de Radiologie, CHU Toulouse-Purpan, 31052 Toulouse Cedex, France). *Rev. Med. Toulouse* 12(8):696-709; 1976.

Selective hepatic arteriography was performed in 20 patients with liver abscess by selective catheterization of the celiac trunk and superior mesenteric artery. Inhomogeneous, irregular arteries were found in all 20 cases, "slurred" arteries in 5, avascular tumor syndrome in all 14 cases of presuppurative hepatitis (non-collected abscess), hypervascularization in 14 cases (mostly non-collected abscesses), and micronodular opacification in 8. Hepatic arteriography was especially valuable in the diagnosis of presuppurative hepatitis.

3846 RADIONUCLIDE LIVER SPOTS: INDICATOR OF LIVER DISEASE OR A BLOOD FLOW PHENOMENON. (Eng.) Tetalman, M. A.; Kusumi, R.; Gaughran, G.; Baba, N. (Ohio State Univ. Hosp., 410 West 10th Ave., Columbus, OH 43210). *Am. J. Roentgenol.* 130 (2):291-296; 1978.

The etiology of "hot spots" in liver scans is examined by a review of four cases of superior vena caval obstruction in which there was a spectrum of liver scan findings including correlative venous collateral pathways through the portal system of the liver. It is shown that a finding of "warm spot" or of no spot is also possible. The patient who demonstrated liver hot spot was shown to have incomplete superior vena caval obstruction with numerous collateral channels below the diaphragm. A patient who initially had a hot spot of numerous collateral channels below the diaphragm at the junction between the right and left liver lobes subsequently showed a warm spot superiorly at that point; it was considerably smaller and less active than the hot spot had been. One patient with complete occlusion of the superior vena cava and one with superior vena caval obstruction secondary to carcinoma showed no spot on liver scan. It is suggested that the hot spot is a well-localized abnormal blood flow phenomenon of collateral channels unrelated to any intrinsic liver disease in which the abnormal blood flow presents the surrounding reticuloendothelial cells with a greater portion of colloid to be phagocytized than in the remainder of the liver. Warm spot may be caused by any large area of venous stasis and is probably related to the venous collateral channels in an area of localized adenomata or interstitial fibrosis. Warm spot cannot differentiate between benign and malignant disease but may suggest intrinsic liver pathology.

3847 PERCUTANEOUS TRANSVENOUS APPROACH TO LIVER BIOPSY. (Ger.) Huchzermeyer, H.; Luska, G. (Medizinische Hochschule Hannover, Karl-Wiechert-Allee 9, 3000 Hannover 61, W. Germany). *Innere Med.* 3(3):174-178; 1976.

A new method of liver biopsy, percutaneous transvenous liver biopsy, affording high accuracy is described. The right internal jugular vein, the subclavian vein, or the left internal jugular vein can be used for the biopsy. The biopsy sample is taken by a Ross needle, and the procedure requires local anesthesia. This technique was used in 22 patients with an obstruction syndrome; no major complications were seen. Transvenous liver biopsy is indicated for patients with blood clotting disorders, long-standing obstructive jaundice, or biliary peritonitis, i.e., for patients in whom transperitoneal liver biopsy is contraindicated. Consequently, transvenous biopsy is not an alternative to transperitoneal blind biopsy. Transvenous liver biopsy is contraindicated in purulent cholangitis, liver abscess, cystic liver, echinococcosis, and cardiac arrhythmia. It can be combined with transjugular cholangiography.

3848 COMPLICATION WITH CONTRAST MEDIUM IN ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATICOGRAPHY. (Ger.) Gmelin, E.; Kramann, B.; Weiss,

H. D. (Institut fur Rontgendiagnostik, Techn. Universitat, Ismaninger Str. 22, D-8000 Munich 80, W. Germany). *Munch. Med. Wochenschr.* 119(44):1439-1440; 1977.

In a series of over 2,000 endoscopic retrograde cholangiopancreatographies, allergic shock to the contrast medium (Conray 60) was observed in a 60-yr-old woman. The cholangiopancreatography was performed in a technically correct manner. The patient developed circulatory collapse 10 min after the administration of the contrast medium. Slow recovery was achieved in about 15 min by cortisone treatment and blood substituent infusion. The patient was fully responsive 30 min after the onset of the shock, and she could be discharged in good condition in 24 hr. This observation indicates that patients with known allergy to contrast media should undergo endoscopic retrograde cholangiopancreatography only if other examinations were unsuccessful and diagnostic evaluation is of vital interest.

3849 THE PEPTIDE PABA TEST. (Ger.) Bornschein, W. (II. Med. Klinik, TU Munchen, Ismaningerstrasse 22, 8 Munich 80, W. Germany). *Fortschr. Med.* 95(42):2559-2564; 1977.

The chymotrypsin specificity of the synthetic peptide *N*-benzoyl-L-tyrosyl-*p*-aminobenzoic acid was tested *in vitro* and *in vivo* in 52 subjects, 34 of whom had normal pancreatic function to evaluate the peptide's usefulness as a screening tool for pancreatopathy. Comparative kinetic tests with bovine chymotrypsin and human activated pancreatic juice, as well as clearance tests with *p*-aminobenzoic acid (PABA), demonstrated that this peptide is suitable for an indirect pancreatic function test. In the clinical tests, PABA was administered p.o. (150 mg in 250 ml water), and the PABA level was determined in 9-hr urine. Both with and without pancreatic stimulation by Lundh's test meal, a significant ($p<0.01$) difference was found in the urinary clearance between patients with exocrine pancreatic insufficiency and subjects with normal pancreas. There were 8.8% false-positive and 6.2% false-negative test results. The 6-hr urinary PABA excretion, expressed in percentage of the dose administered, showed good correlations with the 1-hr amount of chymotrypsin in the pancreozymin-cholecystokinin-secretin test and with the fecal chymotrypsin level. These preliminary results indicate that the PABA test is suitable as a screening method in pancreatopathy.

3850 STUDY ON THE EXOCRINE PANCREATIC FUNCTION BY THE ORAL ADMINISTRATION OF N-BENZOYL-L-TYROSYL-PARA-AMINOBENZOIC ACID. (Eng.) Kato, K.; Izumiyama, S.; Sakakura, M.; Hirayama, A.; Ishii, K. (Asahikawa Medical Coll., 3-11, Kaguraoka, Kagura-cho, Asahikawa, Hokkaido, 078-11, Japan). *Gastroenterol. Jpn.* 12(4):289-292; 1977.

The value of *N*-benzoyl-L-tyrosyl-*p*-aminobenzoic acid (Bz-ty-PABA) in the diagnosis of exocrine pancreatic insufficiency was studied in 11 controls, 10 patients with chronic pancreatitis, 7 patients with diabetes mellitus, and 6 patients with liver cirrhosis who received Bz-ty-PABA (500 mg) p.o. The cumulative 6-hr recovery rate of PABA in the urine was significantly lower ($p<0.005$) in patients with chronic pancreatitis (49.1 ± 10.1%), diabetes mellitus (50.4 ± 20.4%), and liver cirrhosis (52.5 ± 13.0%) than in the control group (79.5 ± 12.0%). This test is useful in the diagnosis of pancreatic exocrine insufficiency, especially in chronic pancreatitis.

3851 PURIFICATION, PARTIAL CHARACTERIZATION, AND CLINICAL EVALUATION OF PANCREATIC ONCOFETAL ANTIGEN. (Eng.) Gelder, F. B.; Reese, C. J.; Moossa, A. R.; Hall, T.; Hunter, R. (Dept. Pathology, Univ. Chicago, Box 414, 950 East 59th St., Chicago, IL 60637). *Cancer Res.* 38(2):313-324; 1978.

The purification and partial characterization of a putative pancreatic oncofetal antigen is described. Human fetal tissue (18- to 20-week gestation) and normal and cancerous adult tissues were examined. Pancreatic oncofetal antigen was shown to be a glycoprotein with a molecular weight between 800,000 and 900,000 daltons, which migrated in the α_2- to β-region on electrophoresis. It was found in fetal pancreas and pancreatic cancer tissue but was not found in normal adult pancreas. Highly purified material migrated as a single band during polyacrylamide gel electrophoresis and caused immunized rabbits to produce monospecific antibody without absorption. Pancreatic oncofetal antigen was clearly different from carcinoembryonic antigen, other known tumor-associated antigens, acute-phase reactants, and normal serum proteins. In addition, a quantitative rocket immunoelectrophoresis assay sensitive enough to detect pancreatic oncofetal antigen in the serum of most patients was developed and used to monitor the purification of pancreatic oncofetal antigen and to evaluate its clinical application. Assays for pancreatic oncofetal antigen were carried out on three panels of sera from different sources. Pancreatic oncofetal antigen was found in the sera of most individuals; however, the highest absolute levels and the highest frequency of elevated levels were found in sera of patients with pancreatic carcinoma. Elevated levels of pancreatic oncofetal antigen were also observed in the serum of some patients with lung, stomach, colon, biliary tract, and breast carcinomas, as well as in the serum of some pregnant women and other individuals with certain benign conditions. The spectrum of patients who have elevated levels of pancreatic oncofetal antigen in their serum is quite different from that found with carcinoembryonic antigen or other known tumor markers. Serial assays were performed on the sera of several patients with cancer of the pancreas; the results suggest that measurement of pancreatic oncofetal antigen may be valuable in monitoring the course of pancreatic cancer.

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Fromm, H.; Schindler, D.; Schmidt, F. W. (Dept. Medicine, Univ. Pittsburgh, Pittsburgh, PA). *Gastroenterology* 72(5, Part 2):1057; 1977.

3853 A ^{14}C-PHENACETIN BREATH TEST IN THE ASSESSMENT OF HEPATIC FUNCTION [Abstract]. (Eng.) Breen, K. J.; Desmond, P. V.; Bury, R.; Calder, I.; Mashford, M. L. (St. Vincent's Hosp., Melbourne, Australia). *Gastroenterology* 72(5, Part 2):1033; 1977.

3854 SPECIAL DIAGNOSTIC TESTS FOR THE EVALUATION OF LIVER AND BILIARY TRACT DISORDERS. (Eng.) Parks, S. N.; Blaisdell, F. W.; Lim, R. C., Jr. (Univ. California, Sch. Medicine, San Francisco, CA). *Surg. Clin. North Am.* 57(2):245-255; 1977.

3855 KINETICS AND DOSIMETRY OF RADIOPHARMACEUTICALS UTILIZED IN EVALUATING LIVER, GALL BLADDER AND SPLEEN [Abstract]. (Eng.) Spencer, R. P.; Hosian, F.; Spitznagle, L. A. (Univ. Connecticut Health Center, Farmington CT 06032). *Int. J. Nucl. Med. Biol.* 4(2):156; 1977.

3856 AN EVALUATION OF ^{99m}Tc-LABELED HEPATOBILIARY AGENTS. (Eng.) Wistow, B. W.; Subramanian, G.; Van Heertum, R. L.; Henderson, R. W.; Gagne, G. M.; Hall, R. C.; McAfee, J. G. (State Univ. New York Upstate Medical Center, 750 Adams St., Syracuse, NY 13210). *J. Nucl. Med.* 18(5): 455-461; 1977.

3857 METHODOLOGY OF ABSORBED DOSE DETERMINATIONS FOR A NEW HEPATOBILIARY IMAGING AGENT (^{99m}Tc-DHTA) [Abstract]. (Eng.) Vanek, K. N.; Brookeman, V. A. (Veterans Admin. Hosp., Gainesville, FL 32605). *Int. J. Nucl. Med Biol.* 4(2): 156; 1977.

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3859 A NON-INVASIVE METHOD FOR DEMONSTRATION OF DUODENAL REFLUX. A RADIOISOTOPE TECHNIQUE [Abstract]. (Eng.) Lawaetz, O.; Baekgard, N. (Glostrup Hosp., Glostrup, Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):56; 1977.

3860 A CHOLYL-14-C-GLYCINE BREATH TEST WITH SIMULTANEOUS DETERMINATION OF SMALL BOWEL TRANSIT TIME [Abstract]. (Eng.) Osterlind, K. (Hillerod County Hosp., Denmark). *Scand. J. Gastroenterol.* 12(Suppl. 45):116; 1977.

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3863 ENDOSCOPY OF THE ENTIRE COLON BY MEANS OF A 105 CM LONG SIGMOIDOSCOPE [Abstract]. (Eng.) Qvigstad, T. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45): 74; 1977.

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3898 A COMPARATIVE STUDY OF INTRAVENOUS CHOLANGIOGRAPHY AND ^{99m}Tc-PYRIDOXYLIDENEGLUTAMATE IN PATIENTS WITH HEPATOBILIARY DISEASE. (Eng.) Stadalnik, R. C.; Rosenquist, C. J. (Sacramento Medical Center, Univ. California, 4301 X St., Sacramento, CA 95817). *Gastrointest. Radiol.* 2(2):141-144; 1977.

3899 DETECTION OF OCCULT GALLBLADDER DISEASE BY DUODENAL DRAINAGE. (Eng.) Porterfield, G.; Cheung, L. Y.; Berenson, M. (Univ. Utah Coll. Medicine, Salt Lake City, UT). *Am. J. Surg.* 134(12): 702-704; 1977.

3900 PECTUS EXCAVATUM CAUSING A FALSE-POSITIVE DEFECT IN THE LIVER. (Eng.) Izhar, M. (Silas B. Hays Hosp., Box 353, Fort Ord, Monterey, CA 93941). *Clin. Nucl. Med.* 2(11):392-394; 1977.

3901 CORRELATION BETWEEN DIAGNOSTIC $^{59}Fe^{2+}$-ABSORPTION AND SERUM FERRITIN CONCENTRATION IN MAN. (Eng.) Heinrich, H. C.; Bruggemann, J.; Gabbe, E. E.; Glaser, M. (Universitats-Krankenhaus Eppendorf, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Z. Naturforsch.* [*C*] 32(11/12):1023-1025; 1977.

3902 REEXAMINATION OF THE DELETERIOUS EFFECTS OF GASTROINTESTINAL CONTRAST MATERIAL ON ABDOMINAL ECHOGRAPHY. (Eng.) Sarti, D. A.; Lazere, A. (Univ. California at Los Angeles Center Health Sciences, Los Angeles, CA 90024). *Radiology* 126(1):231-232; 1977.

3903 COMPLICATIONS OF WEDGE HEPATIC VENOGRAPHY. (Eng.) Castaneda-Zuniga, W. R.; Jauregui, H.; Rysavy, J. A.; Formanek, A.; Amplatz, K. (Univ. Minnesota Hosp., 420 Delaware St. S.E., Minneapolis, MN 55455). *Radiology* 126(1):53-56; 1978.

3904 CONTINUOUS ELECTROCARDIOGRAPHIC MONITORING WITH HOLTER ELECTROCARDIOCORDER THROUGHOUT ALL STAGES OF GASTROSCOPY. (Eng.) Levy, N.; Abinader, E. (Rothschild Univ. Hosp., P.O. Box 4940, Haifa, Israel). *Am. J. Dig. Dis.* 22(12): 1091-1096; 1977.

See also, 3472, 3493, 3803, 3905, 3906, 3914, 3921, 3922, 3928, 3929, 3941, 3943, 3950, 3951, 3953, 3970, 3978, 3992, 4006, 4019, 4046, 4052, 4059, 4064, 4069, 4076, 4080, 4084, 4088, 4099, 4107, 4109, 4110, 4148, 4155, 4163, 4172, 4182, 4223, 4224, 4244, 4256, 4261, 4267, 4269, 4278.

GASTROINTESTINAL DISEASES

ESOPHAGUS

3905 pH-METRIC INVESTIGATION OF GASTROESOPHAGEAL REFLUX FOLLOWING PENTAGASTRIN ADMINISTRATION. (Ger.) Pflucke, F.; Arendt, R. (Klinik fur Innere Medizin des Bereichs Medizin, Wilhelm-Pieck-Universitat, Ernst-Heydemann-Strasse, DDR-25 Rostock, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(3):117-122; 1977.

Gastroesophageal reflux was measured by pH-metric tests in 36 patients, including 16 with acute reflux symptoms, 6 with mild symptoms, and 14 without symptoms. The tests were conducted in the morning 24 hr after administration of medication and 12 hr after intake of food. The patients swallowed a glass electrode after it had been determined that the pH was <2.0 in their stomachs; pH activities in the distal esophagus were monitored for 1 hr. The patients were then given pentagastrin (6 μg/kg body weight, s.c.) and monitored for 1 hr. Reflux frequency was determined by the number of times the pH level fell below 4; total reflux duration was the total of all separate refluxes. Spontaneous gastroesophageal reflux was observed in six patients during the tests. Of 30 patients without reflux before pentagastrin administration, 19 demonstrated gastroesophageal reflux after pentagastrin; reflux was absent in 11 patients. Pentagastrin appears to stimulate reflux in patients with common reflux problems, but is not effective in patients free of symptoms. Pentagastrin can be diagnostically useful in pH-metric reflux tests.

3906 POSSIBILITIES AND DIAGNOSIS OF EARLY CANCER OF THE STOMACH AND ESOPHAGUS. (Rus.) Vasilenko, V. Kh.; Vodolagin, V. D.; Grebenev, A. L.; Polozhenkova, L. A.; Matyushina, E. D. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 55(6):21-26; 1977.

3907 STATE OF ELECTROLYTE METABOLISM IN THE POSTOPERATIVE PERIOD IN PATIENTS WITH ESOPHAGEAL AND GASTRIC CARDIA CANCER UNDERGOING PREOPERATIVE TELEGAMMATHERAPY. (Rus.) Shemchuk, A. S.; Ganul, V. L.; Kudria, S. N.; Lisetsky, V. A.; Lialkov, G. S.; Sakun, F. T. (Kiev Scientific Res. Inst. Rentgeno-Radiology and Oncology, Kiev, USSR). *Klin. Khir.* (5):6-10; 1977.

3908 A CASE OF TRANSVERSE MESENTERIC VOLVULUS. (Ita.) Marvulli, G. (Istituto di Semeiotica Medica, Universita degli Studi di Bari, Bari, Italy). *Minerva Med.* 68(25):1755-1759; 1977.

3909 HIATAL HERNIA AS A CAUSE OF SEGMENTAL AGANGLIONOSIS OF THE SMALL INTESTINE. (Ger.) Janneck, C.; von Ekesparre, W. (Kinderkrankenhaus Walddorfer, 2000 Hamburg-Dovenstedt, W. Germany). *Z. Kinderchir.* 20(3):275-280; 1977.

3910 THE USE OF FOGARTY BALLOON CATHETER FOR DILATATION OF POSTOPERATIVE ESOPHAGEAL STRICTURE. (Jpn.) Kugimiya, T.; Shirabe, J.; Kaku, K.; Kusaba, E.; Hadama, T.; Fukushima, K.; *et al.* (Nagasaki Univ. Sch. Medicine, Nagasaki, Japan). *J. Thorac. Surg.* 30(5):419-422; 1977.

3911 A CASE OF ESOPHAGEAL DUPLICATION. (Jpn.) Yamazaki, Y.; Honna, T.; Kitamura, T.; Sawaguchi, S.; Shimizu, K.; Morikawa, Y. (Natl. Children's Hosp., Tokyo, Japan). *Jpn. J. Thorac. Surg.* 30(4):363-366; 1977.

3912 ESOPHAGEAL STENOSIS CAUSED BY GASTROESOPHAGEAL REFLUX. (Pol.) Moron, K.; Jaskiewicz, A. (Acad. Medicine, ul. M. Sklodowskiej-Curie 68, 40-369 Wroclaw, Poland). *Pol. Przegl. Radiol. Med. Nukl.* 41(2):135-139; 1977.

3913 MEDIASTINAL ABSCESS OF ESOPHAGEAL ORIGIN: REPORT OF 11 CASES. (Fre.) Gaillard, J.; Eschapasse, H.; Petel, B.; Fournial, G.; Berthoumieu, F. (Hopital Purpan, 31052 Toulouse Cedex, France). *Ann. Chir. Thorac. Cardiovasc.* 16(2):147-151; 1977.

3914 ENDOSCOPIC MANAGEMENT OF ESOPHAGEAL VARICES. (Ger.) Denck, H. (Krankenhauses der Stadt, Wolkersbergenstr. 1, A-1130 Wien/Lainz, Austria). *Chirurg* 48(4):212-218; 1977.

3915 POSTOPERATIVE REFLUX ESOPHAGITIS. (Rus.) Kukosh, V. I.; Chernyavsky, A. A. (Gorki Medical Inst., Gorki, USSR). *Khirurgiia (Mosk.)* (6):3-8; 1977.

3916 DYSPHAGIA AS A SYMPTOM OF IDIOPATHIC CHRONIC FIBROUS MEDIASTINITIS. (Ger.) Haas, N.; Dragojevic, D.; Borst, H. G. (Medizinische Hochschule Hannover, Karl-Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *Chirurg* 48(7):434-438; 1977.

3917 ESOPHAGECTOMY WITHOUT THORACOTOMY--A NEW TECHNICAL APPROACH. (Por.) Pinotti, H. W. (Facultade de Medicina da Universidade de Sao Paulo, Sao Paulo, Brazil). *Arq. Gastroenterol.* 14(2):93-98; 1977.

3918 INTRAMUSCULAR OIL-BLEOMYCIN INJECTIONS AS PREOPERATIVE TREATMENT FOR SQUAMOUS CELL CARCINOMA OF THE ESOPHAGUS. (Jpn.) Sannohe, Y.; Hirano, M.; Doki, K. (Sch. Medicine, Fukuoka Univ., Fukuoka, Japan). *Jpn. J. Cancer Clin.* 23(8):810-817; 1977.

3919 POLAROGRAPHY AS A TECHNIQUE FOR DETERMINING THE VIABILITY OF GRAFTS USED IN ESOPHAGOPLASTY. (Rus.) Rubailov, Yu. A.; Kalinin, A. N.; Verkhovodko, P. S. (Volgograd Medical Inst., Volgograd, USSR). *Khirurgiia (Mosk.)* (8):62-66; 1977.

3920 DIAGNOSIS OF DISEASES OF THE ESOPHAGUS. (Ger.) Heitmann, P. (Abteilung fur Innere Medizin II, Krankenstalten Duren, Roonstrasse 30, D-5160 Duren, W. Germany). *Internist (Berlin)* 18(8):409-416; 1977.

3921 ESOPHAGOSCOPY UNDER ANESTHESIA USING DIFFUSION BREATHING. (Rus.) Khylstov, V. N. (Irkutsk Medical Inst. at No. 1 "Znak Pocheta" Oblast Clinical Hosp., Irkutsk, USSR). *Klin. Khir.* (3):52-54; 1977.

3922 ECG TESTS DURING ESOPHAGOGASTRODUODENOSCOPY. (Ger.) Libor, J.; Pocsai, G.; Ivanyi, J. (IIIrd Dept. Internal Medicine, County Hosp., H-5701 Gyula, Hungary). *Z. Gastroenterol.* 15(5):293-299; 1977.

3923 TACTICAL APPROACH TO ESOPHAGEAL RESECTION. (Ger.) Sturzenegger, H. (Mottastrasse 4, Ch-3005 Bern, Switzerland). *Chirurg* 48(7):467-470; 1977.

3924 RELATIVELY RARE, IMPORTANT DISEASES OF THE ESOPHAGUS. (Ger.) Rosch, W. (Medizinische Universitatsklinik, Krankenhausstrasse 12, D-8520 Erlangen, W. Germany). *Internist (Berlin)* 18(8):444-450; 1977.

3925 CARCINOMA OF THE ESOPHAGUS AND CARDIA. (Ger.) Siewert, R.; Lepsien, G.; Peiper, H. J. (Klinik und Poliklinik fur Allgemeinchirurgie, Universitat Gottingen Gosslerstrasse 10, D-3400, Gottingen, W. Germany). *Internist (Berlin)* 18(8): 451-462; 1977.

3926 RESECTION OF THE THORACIC PART OF THE ESOPHAGUS AND ESOPHAGOSTOMA. (Rus.) Kochetov, N. G. (A. V. Lunacharskii Astrakhan' Medical Inst., Astrakhan', USSR). *Klin. Khir.* (3):55-57; 1977.

3927 ESOPHAGEAL DYSFUNCTION. (Ger.) Wienbeck, M. (2. Medizinische Klinik und Poliklinik, Universitat Dusseldorf, Moorenstrasse 5, D-4000 Dusseldorf, W. Germany). *Internist (Berlin)* 18(8): 417-422; 1977.

3928 DIAGNOSITIC POSSIBILITIES OF PROGRAMMED LARGE-FRAME FLUOROGRAPHY IN THE COMPLEX STUDY OF THE ESOPHAGUS IN SYSTEMIC SCLERODERMA. (Rus.) Sokolov, Yu. N.; Savarovsky, A. I.; Kovriga, Yu. P.; Grebneva, L. S.; Filimonov, R. M. (Central Inst. Postgraduate Medical Studies, Moscow, USSR). *Vestn. Rentgenol. Radiol.* (2):10-16; 1977.

See also, 3500, 3507, 3641, 3795, 3872, 3876, 3889, 3891, 3892, 3896, 3902, 3929, 3946, 3953, 3968, 3969, 3970, 3971, 3985, 4160, 4172, 4173, 4174, 4236.

STOMACH

3929 QUANTITATIVE DETERMINATION OF PYLORIC REGURGITATION IN RESPONSE TO INTRADUODENAL BOLUS INJECTION. (Eng.) Rokkjaer, M.; Marqversen, J.; Kraglund, K.; Petersen, J. B. (Kommunehospitalet, Aarhus, Denmark). *Scand. J. Gastroenterol.* 12(7):827-832; 1977.

Duodeno-gastric regurgitation was measured quantitatively in patients using ^{99m}technetium-colloid and external scanning. The median reflux for 32 patients with type I gastric ulcer was 14% (range, 3-100%), which was significantly ($p<0.05$) higher than the median reflux of 4% (range, 1-13%) for 9 controls and the median reflux of 5% (range, 0-16%) for 9 duodenal ulcer patients. There was no significant difference between the reflux in the control and duodenal ulcer groups. When 14 different examinations were evaluated twice, the standard deviation of the differences between the two interpretations was 5.88% with a 95% confidence interval of 4.30-9.27%, which differences were not significant. Thus, the test had fairly good reproducibility. When the reflux test was performed in eight patients before and after antrectomy, a large variance and an absence of a significant difference between the two tests were observed. Although the two tests before and after antrectomy in each of the eight patients differed considerably, a larger reflux was found through the relatively large stoma of a gastro-duodenostomy in only half of the patients after the operation.

3930 EFFECT OF SODIUM BICARBONATE ON ASPIRIN-INDUCED DAMAGE AND POTENTIAL DIFFERENCE CHANGES IN HUMAN GASTRIC MUCOSA. (Eng.) Bowen, B. K.; Krause, W. J.; Ivey, K. J. (Harry S Truman Veterans Admin. Hosp., Columbia, MO 65201). *Br. Med. J.* 2(6094):1052-1055; 1977.

A study was performed to determine whether a small amount of sodium bicarbonate (equivalent to one-

hird of a teaspoonful of baking soda) could pro-
ect against the microscopic gastric mucosal dam-
ge known to be produced by the ingestion of two
spirin tablets in 100 ml of fluid. Sequential
astric biopsy specimens were taken from 15 healthy
ubjects before, during, and after the intragastric
nstillation of one of the following isotonic sol-
tions: saline, sodium bicarbonate, 600 mg aspirin
uspended in sodium bicarbonate, and aspirin sus-
ended in saline. On a separate day, the same
olutions were instilled, but gastric transmucosal
otential differences were monitored. Light mi-
roscopy and scanning electron microscopy of the
iopsy specimens showed occasional mucous degran-
lation of mucosal surface cells, but no cell
amage during instillation of sodium bicarbonate.
ight microscopy studies 10 min after instillation
f aspirin in saline showed damage in 20% of sur-
ace cells, with focal areas of cellular disrup-
ion and microscopic erosions, but only 3.4% of
ells were damaged after aspirin in bicarbonate,
nd there were no erosions. Electron microscopy
howed a damaged honeycomb appearance of surface
pithelium after aspirin in saline and a normal
obblestone appearance after aspirin in bicarbonate.
spirin dissolved in bicarbonate failed to induce
he usual fall in potential difference. These
indings indicate that sodium bicarbonate in
mounts equivalent to one-third of a teaspoonful
f baking soda protects the gastric mucosa against
spirin-induced damage and prevents the usual fall
n potential difference after aspirin ingestion.

931 THE HEATER PROBE: A NEW ENDOSCOPIC METHOD
FOR STOPPING MASSIVE GASTROINTESTINAL
LEEDING. (Eng.) Protell, R. L.; Rubin, C. E.;
uth, D. C.; Silverstein, F. E.; Terou, F.; Dennis,
.; *et al.* (Dept. Medicine RG-20, Univ. Washington,
eattle, WA 98195). *Gastroenterology* 74(2, Part
):257-262; 1978.

heater probe that can be passed via an endoscope
nd that can apply pressure and heat simultaneously
o a bleeding vessel was developed. A 6.4-mm dia-
eter prototype and a 3.2-mm diameter working model
f this device were tested for efficacy in stopping
assive bleeding in experimental canine gastric ul-
ers. Randomized, internally controlled experiments
ere carried out at laparotomy in heparinized dogs
sing standard-sized gastric ulcers made and treat-
d via an ample gastrotomy. In acute experiments,
he heater probe stopped bleeding from all treated
lcers, whereas all untreated control ulcers con-
inued bleeding. In chronic studies performed at
terile laparotomy, the depth of injury produced
y heater probe coagulation was systematically
valuated; dogs were killed at intervals from 1 week
o 1 month. No perforations occurred, but histo-
logical injury was evident extending from the ul-
er base to the serosa in 7 of the 18 ulcers treat-
d with the 6.4-mm probe and in 2 of the 30 ulcers
reated with the 3.2-mm probe. In a preliminary
ndoscopic experiment, the 3.2-mm probe stopped
leeding in 18 of 19 acute experimental ulcers.
istological evidence of injury extending to the
erosa occurred in six instances; no perforations
occurred. The efficacy in stopping bleeding with this method is satisfactory, but the depth of injury should be reduced before it is applied to humans.

3932 ENDOSCOPIC LASER TREATMENT. III. DEVELOPMENT AND TESTING OF GAS-JET-ASSISTED ARGON LASER WAVEGUIDE IN CONTROL OF BLEEDING EXPERIMENTAL ULCERS. (Eng.) Silverstein, F. E.; Protell, R. L.; Gulacsik, C.; Auth, D. C.; Deltenre, M.; Dennis, M.; *et al.* (Dept. Medicine, RG-20, Univ. Washington, Seattle, WA 98195). *Gastroenterology* 74(2, Part 1):232-239; 1978.

A new argon laser system for the treatment of ulcer bleeding is described, and its efficacy and safety were evaluated in the treatment of experimental canine gastric ulcers. The system consists of a catheter that can be inserted via an endoscopic biopsy channel to deliver a jet of CO_2 coaxially with an argon laser beam. The efficacy of this system in stopping bleeding was tested in two acute experiments at laparotomy in heparinized dogs using a gastric ulcer model. At 7 W of power, the gas jet-assisted laser proved 100% effective in stopping bleeding with an average of three 5-sec exposures, as compared to the same laser without added CO_2, which required an average of eleven 5-sec exposures. Furthermore, the 7-W laser without added CO_2 did not stop all ulcer bleeding. The safety of the CO_2 laser system was tested in a chronic experiment at sterile laparotomy using the same ulcer model. No ulcer treated with the 7-W gas jet-assisted argon laser showed histologic evidence of full thickness injury. When the efficacy of various wattages of the gas jet-assisted laser in stopping bleeding from the ulcer model was tested, the wattages used in this series of experiments and in previous experiments proved to be in the efficacious range. It is concluded that CO_2 added coaxially to a 6- to 7-W argon laser increases the efficacy of coagulation while reducing the depth of injury.

3933 GRADE OF INVASION OF GASTRIC CANCER AT THE TIME OF DIAGNOSIS. (Spa.) Perez Mota, A.; Villalobos Gamez, J. M.; Alberdi Frias, J. M.; Linares Garcia, F.; Moreno Gonzalez, E.; Hidalgo Pascual, M.; *et al.* (Servicio-Escuela de Enfermedades Digestivas del Instituto Nacional de Prevision, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(4):353-362; 1977.

The diagnostic and clinical aspects of gastric cancer are described on the basis of 68 cases. It was possible to diagnose 98% of all cases by the combination of x-raying, biopsy, endoscopy, and cytology. Dyspeptic syndrome was found in 16 patients (average duration 8.8 months), ulcerous syndrome in 52 (average duration 10.3 months), neoplastic syndrome in 60, and macroscopic hemorrhage in 14. The tumor was localized in the antrum in 55% of all cases, in the corpus of the stomach in 25%, and in the magenblase in 12.5%; practically total invasion of the stomach was found in 7%. Adenocarcinoma was diagnosed in 60 cases (highly differentiated tumor in 27 cases, medium differentiated tumor in 12, and tumor of low degree of differentiation in 21). Calix-like metaplasia was seen in 22 of these 60 cases. Signet-ring cell tumor was found in eight cases. Solitary or multiple metastases were found at diagnosis in 58 patients: lymph node metastases accounted for 25.4%; hepatic metastases for 17.6%; pancreatic metastases for 15.6%; vascular metastases for 7.8%; mesenteric metastases for 13.7%; diaphragmatic, peritoneal, colonic, and esophageal metastases for 3.9%; and splenic and retroperitoneal metastases for 1.9%. The tumor invaded the serosa in 6 of the 10 metastasis-free patients, and it was limited to the mucosa and submucosa in the 4 others. The findings indicate the great value of complex screening in high-risk groups.

3934 PRIMARY GASTRIC STUMP CARCINOMA. (Ger.) Wolf, O.; Pannenborg, G.; Voigtsberger, P. (Chirurgische Klinik, Medizinische Akademie, Nordhauser Str. 74, DDR-50 Erfurt, E. Germany). *Zentralbl. Chir.* 102(19):1183-1187; 1977.

The diagnosis and treatment of gastric stump carcinoma are reviewed. Gastric or duodenal resection was performed in 3,476 patients during the 1956-1975 period, among whom 35 patients had carcinoma of the gastric stump. The latent period was 6-38 yr, averaging 21 yr. Epigastric pains, loss of weight, emesis, loss of appetite, nausea, and eructation were the most frequent symptoms. Exploratory laparotomy was performed or endoprosthesis was inserted in 25 cases; radical surgery was possible in only 10 cases. The postoperative mortality was 11/35; 23 patients survived 2-15 months (average, 5.3 months). The 5-yr cure rate was 1/35. The findings indicate that prognosis can be improved only be earlier diagnosis.

3935 STUDY OF HUMORAL IMMUNITY AND GASTRIC FUNCTION IN SUBJECTS WITH VITILIGO. (Ita.) Farini, R.; Veller, C.; Di Mario, F.; Trovo, M.; Borrelli, A.; Meani, A.; *et al.* (Istituto di Clinica Medica I Univ., Padova, Italy). *Minerva Dermatol.* 111(5):271-278; 1976.

Humoral immunity and gastric function were studied in 31 patients with vitiligo. Concomitant diseases included duodenal ulcer in two patients, gastritis in one, and cholelithiasis in two. The subjective complaints included dyspepsia in seven patients, epigastric pains in two, and biliary colic in one. The gastrin level was significantly higher in the patients than in 39 healthy controls (47 ± 26 pg/ml versus 32 ± 20 pg/ml, $p<0.005$). There were no significant differences between the patients and the controls in terms of the basal acid output, maximal acid output, and the peak half-hour acid output, but the values measured in the patients were at the upper limit of the normal range. Hypochlorhydria (maximal acid output below 4 mEq/hr) was found in three patients. Disease associations and biohumoral and immunological alterations were more frequent in patients with hypergastrinemia and/or circulating autoantibodies. There is, however, no clear evidence supporting the immunological pathogenesis of vitiligo.

3936 AGENTS AFFECTING GASTROINTESTINAL FUNCTIONS. (Eng.) Lipinski, C. A.; Hohnke, L. A. (Pfizer Inc., Groton, CT 06340). *Ann. Rep. Med. Chem.* 12:91-100; 1977.

3937 FUNCTIONAL AND MORPHOLOGICAL ASPECTS OF THE STOMACH AND DUODENUM IN CHRONIC RENAL FAILURE [Abstract]. (Eng.) Salera, M.; Biasco, G.; Di Febo, G.; Baldi, F.; Cassan, M.; Miglioli, M.; Barbara, L. (Cattedra di Gastroenterologia dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 9(1):63-64; 1977.

3938 CORRELATION IN POST-OPERATIVE STOMACHS BETWEEN GROSS APPEARANCE AND HISTOLOGIC FINDINGS [Abstract]. (Eng.) Tarder, G.; Burbige, E. J.; French, S. W.; Belber, J. P. (Veterans Admin. Hosp., Martinez, CA). *Gastroenterology* 72(5, Part 2):1167; 1977.

3939 NITROGEN-SPARING EFFECT OF DIFFERENT FEED REGIMES IN PATIENTS AFTER OPERATION. (Eng.) Rowlands, B. J.; Giddings, A. E. B.; Johnston, A. O. B.; Hindmarsh, J. T.; Clark, R. G. (Northern General Hosp., Sheffield, Yorkshire, England). *Br. J. Anesth.* 49(8):781-787; 1977.

3940 ENDOSCOPIC EXAMINATION OF THE OPERATED STOMACH [Abstract]. (Eng.) Geile, D.; Ultsch, B. (Surgical Clinic of the Clinicum re. d. Isar, Technical Univ., Munich, W. Germany). *Endoscopy* 9(2):115; 1977.

3941 TUBELESS HYPOTONIC EXAMINATION OF THE AFFERENT LOOP OF THE BILLROTH II STOMACH. (Eng.) Op Den Orth, J. O. (St. Elisabeth's Groote Gasthuis, Boerhaavelaan 22, Haarlem, Netherlands). *Gastrointest. Radiol.* 2(1):1-5; 1977.

3942 TREATMENT OF STENOTIC ANASTOMOSES AFTER GASTRECTOMY BY ENDOSCOPY [Abstract]. (Eng.) Weiss, H.; Hold, H.; Neumayr, A.; Schuller, J. (First Dept. Medicine, KA Rudolfstiftung, Vienna, Austria). *Endoscopy* 9(2):113-114; 1977.

3943 THE ANASTOMOSIS AFTER TOTAL GASTRECTOMY--A DOMAIN OF ENDOSCOPY [Abstract]? (Eng.) Ultsch, B.; Geile, D. (Surgical Clinic, Technical Univ., Munich, W. Germany). *Endoscopy* 9(2):116; 1977.

3944 BONE COMPOSITION AND VITAMIN D AFTER POLYA GASTRECTOMY. (Eng.) Tougaard, L.;

Rickers, H.; Rodbro, P.; Thaysen, E. H.; Christensen, M. S.; Lund, B.; Sorensen, O. H. (Alborg General Hosp., Alborg, Denmark). *Acta Med. Scand.* 202(1/2):47-50; 1977.

3945 VITAMIN B12 DEFICIENCY FOLLOWING POLYA GASTRECTOMY. A LONG-TERM FOLLOW-UP. (Eng.) Buxton, R. A.; Collins, C. D.; Phillips, M. J. (Princess Margaret Hosp., Okus Rd., Swindon, Wilts SN1 4JU, England). *Br. J. Clin. Pract.* 31(6):69-72; 1977.

3946 FUNDOPLICATION FOR HYPOTENSIVE LOWER ESOPHAGEAL SPHINCTER AFTER GASTRECTOMY. (Eng.) Ellis, F. H., Jr. (Lahey Clinic Foundation, Boston, MA). *Surg. Gynecol Obstet.* 145(3):430-431; 1977.

3947 EARLY AND LATE RADIOLOGICAL FEATURES OF DAMAGE TO THE STOMACH CAUSED BY ACID INGESTION. (Eng.) Kleinhaus, U.; Rosenberger, A.; Adler, O. (Rambam Univ. Hosp., Haifa, Israel). *Radiol. Clin. (Basel)* 46(1):26-37; 1977.

3948 CIMETIDINE PROTECTION FROM ASPIRIN-INDUCED HUMAN GASTRIC MUCOSAL DAMAGE [Abstract]. (Eng.) Ivey, K. J.; Mackercher, P. A.; Baskin, W. N.; Krause, W.; Jeffrey, G. E. (Dept. Medicine, Univ. Missouri, Columbia, MO). *Rend. Gastroenterol.* 9(1):79; 1977.

3949 COMPARISON OF EFFECT OF ASPIRIN ON GASTRIC MUCOSA OF CHRONIC RHEUMATOID ARTHRITICS WITH NORMAL SUBJECTS [Abstract]. (Eng.) MacKercher, P. A.; Ivey, K. J.; Baskin, W. N.; Krause, W. J.; Tatum, W.; Morris, A. (Veterans Admin. Hosp., Columbia, MO). *Gastroenterology* 72(5, Part 2):1092; 1977.

3950 ANALYSIS OF THE DIAGNOSTIC ACCURACY OF RADIOLOGY, ENDOSCOPY AND BIOPSY IN GASTRIC CANCER [Abstract]. (Eng.) Stern, H.; Medline, A. (Toronto Western Hosp., Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1179; 1977.

3951 THE ACCURACY OF THE BARIUM MEAL IN THE DIAGNOSIS OF CARCINOMA OF THE STOMACH. (Eng.) Allan, S.; Coates, R. H. (Christchurch Hosp., New Zealand). *Aust. Radiol.* 20(3):236-238; 1977.

3952 MULTIPLE "SPOT" BIOPSY TECHNIQUE FOR INFILTRATIVE GASTRIC CARCINOMA. (Eng.) Altman, A. R.; Finkel, S.; Waye, J. D. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Mt. Sinai J. Med.* 44(4):570-573; 1977.

3953 ENDOSCOPIC FOLLOW-UP STUDIES IN RESECTED PATIENTS WITH CARCINOMA OF THE ESOPHAGUS AND STOMACH [Abstract]. (Eng.) Groitl, H.; Vollmar, D.; Tonak, J. (Univ. Hosp. Erlangen, Erlangen, W. Germany). *Endoscopy* 9(2):115; 1977.

3954 HISTOGENETIC TYPES AND SIZE OF POLYPOID LESIONS IN THE STOMACH, WITH SPECIAL REFERENCE TO CANCEROUS CHANGE. (Eng.) Kozuka, S.; Masamoto, K.; Suzuki, S.; Kubota, K.; Yokoyama, Y. (Nagoya Univ. Sch. Medicine, 65 Tsurumai-cho, Showa-ku, Nagoya 466, Japan). *Gann* 68(3):267-274; 1977.

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3957 GASTRIC CARCINOMA 2. AN ANALYSIS OF MORPHOLOGICAL AND PROGNOSTIC PARAMETERS CORRELATED TO THE CLASSIFICATION PROPOSED BY MASSON, REMBER AND MULLIGAN. (Eng.) Teglbjaerg, P. S.; Vetner, M. (Odense Hosp., 5000 Odense, Denmark). *Acta Pathol. Microbiol. Scand. [A]* 85(4):528-534; 1977.

3958 GASTRIC CANCER FOLLOWING MEDICAL OR SURGICAL TREATMENT OF PEPTIC ULCER [Abstract]. (Eng.) Papachristou, D.; Fortner, J. G. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Gastroenterology* 72(5, Part 2):1163; 1977.

3959 ADENOCARCINOMA OF THE PROXIMAL THIRD OF THE STOMACH. PITFALLS IN SURGICAL MANAGEMENT. (Eng.) Alfonso, A.; Rosen, P.; Guerra, O.; Fortner, J. (Downstate Medical Center, 450 Clarkson Ave., Brooklyn, NY 11203). *Am. J. Surg.* 134(3):326-330; 1977.

3960 BENIGN LESIONS OF THE STOMACH MIMICKING CARCINOMA. (Eng.) Herzog, R. J.; Hanelin, L. G.; Margulis, A. R. (Univ. California Sch. Medicine, San Francisco, CA 94143). *JAMA* 238(7):623-626; 1977.

3961 LEIOMYOMAS OF THE STOMACH. (Eng.) Singh, R. P.; Zamora, I.; Lee, S. T. J.; Laquer, W. A. (Beckley Appalachian Regional Hosp., P.O. Box 1149 Beckley, WV 25801). *Int. Surg.* 62(6/7):352-354; 1977.

STOMACH

3962 METASTATIC PATTERN AND LENGTH OF SURVIVAL IN PATIENTS WITH LIVER METASTASES FROM GASTRIC CANCER. (Eng.) Okazaki, N.; Seto, T.; Kanda, Y.; Yoshino, M.; Yoshida, T. (Natl. Cancer Center Hosp., Tokyo, Japan). *Jpn. J. Clin. Oncol.* 7(1):5-8; 1977.

3963 RESULTS OF SURGERY FOR GASTRIC CANCER AND EFFECT OF ADJUVANT MITOMYCIN C ON CANCER RECURRENCE. (Eng.) Imanaga, H.; Nakazato, H. (Aichi Cancer Center Hosp., 81-1159, Kanokoden, Tashiro-cho, Chikusa-ku, Nagoya 464, Japan). *World J. Surg.* 1(2):213-221; 1977.

3964 SERUM GASTRIN RESPONSES TO STIMULATION TESTS IN PATIENTS WITH GASTRINOMA [Abstract]. (Eng.) Vezzadini, P.; Bonora, G.; Tomassetti, P.; Cavicchi, A.; Cipollini, F.; Sternini, C.; *et al.* (Istituto di Clinica Medica dell'Universita, Bologna, Italy). *Rend. Gastroenterol.* 9(1):62; 1977.

See also, 3550, 3558, 3562, 3571, 3575, 3576, 3581, 3582, 3593, 3594, 3595, 3596, 3766, 3798, 3799, 3827, 3843, 3864, 3868, 3869, 3872, 3876, 3879, 3889, 3892, 3896, 3904, 3905, 3906, 3907, 3912, 3922, 3925, 3947, 3965, 3968, 3969, 3970, 3971, 3973, 3981, 3982, 3985, 3987, 3988, 3989, 4234, 4236, 4245, 4246, 4259.

STOMACH

Peptic Ulcers

3965 CHRONIC GASTRITIS AND PEPTIC ULCER. (Eng.) Zaterka, S.; Vieira, F. E.; Pfuhl Neves, D.; da Silva, E. P.; Carneiro Leao, G.; Bettarello, A. (Medical Sch., Univ. Sao Paulo, Rua Estados Unidos, 1470, Sao Paulo, Brazil). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):381-385; 1977.

The incidence of gastritis was determined in 51 patients with duodenal ulcer and 46 with gastric ulcer, and the relationship between gastritis and the location of the ulcer was studied. Six biopsies (3 from the antrum and 3 from the body) were obtained from each patient under direct vision at endoscopy. Chronic gastritis was classified according to the grade of inflammation (slight, moderate, or intense) and its location (antritis or pangastritis). In gastric ulcer, the relationship between frequency of chronic gastritis and the site of the ulcer (antrapyloric, at the angulus, body of the stomach) was also established. Antritis was as frequently observed in duodenal ulcer (94%) as in gastric patients (96%), but severe inflammation of the antrum was higher in gastric ulcer (43%) than in duodenal ulcer (17%). Chronic gastritis of the gastric body was always accompanied by antritis in both gastric and duodenal ulcer; gastritis was observed in 63% of the former group and 37% of the latter. Severe inflammation of the glandular portion of the stomach occurred in only one patient with duodenal ulcer (2%) and in seven with gastric ulcer (15%). No relationship between the site of gastric ulcer and the frequency of chronic gastritis was observed.

3966 EFFECT OF CIMETIDINE ON BILIARY AND PANCREATIC FUNCTION IN MAN [Abstract]. (Eng.) Maudgal, D. P.; Lawrence, D.; Bird, R.; Sanderson, P.; Northfield, T. C. (St. James' Hosp., London, England). *Gut* 18(11):A981; 1977.

3967 ABNORMAL GASTRIC EMPTYING RESPONSE TO PENTAGASTRIN IN DUODENAL ULCER [Abstract]. (Eng.) Dubois, A.; Myers, L.; Castell, D. O. (Uniformed Services Univ. Health Sciences, Bethesda, MD). *Clin. Res.* 25(4):571A; 1977.

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3969 GASTRO-OESOPHAGEAL REFLUX IN DUODENAL ULCER AND AFTER PARIETAL CELL VAGOTOMY (PCV), SELECTIVE GASTRIC VAGOTOMY PLUS DRAINAGE (SGV + D) AND SELECTIVE GASTRIC VAGOTOMY PLUS ANTRECTOMY (SGV + A) [Abstract]. (Eng.) Oster, M.; Csendes, A.; Brandsborg, O.; Brandsborg, M.; Amdrup, E. (Kommunehospitalet, Univ. Arhus, Arhus, Denmark). *Gut* 18(11):A974; 1977.

3970 EARLY ENDOSCOPY AND OUTCOME OF THE PATIENT WITH UPPER GASTROINTESTINAL BLEEDING [Letter to Editor]. (Eng.) Rohde, H.; Troidl, H.; Fischer, M.; Vestweber, K. H.; Lorenz, W. (Dept. Surgery, Philipps Univ., Robert-Koch-Strasse 8, 355 Marburg, W. Germany). *Gastroenterology* 73(5): 1188-1189; 1977.

3971 ACUTE UPPER GASTROINTESTINAL HEMORRHAGE [Abstract]. (Eng.) Farthmann, E. H. (Univ. Hosp. Eppendorf, 2000 Hamburg 20, W. Germany). *Endoscopy* 9(3):185; 1977.

3972 DIBUCAINE NUMBER (DN) IN DUODENAL ULCER [Letter to Editor]. (Eng.) Ahmad, K.; Anwar, N.; Sattar, A. (Inst. Postgraduate Medicine and Res., Shahbag, Dacca, Bangladesh). *Am. J. Dig. Dis.* 22(10):933; 1977.

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3978 TRIAL OF HISTALOG® IN PATIENTS WITH PEPTIC ULCER AND IN OPERATED PATIENTS: COMPARISON OF THE CONTROL AND GASTRECTOMIZED PATIENTS WITHOUT ULCER. (Por.) Zaterka, S.; Lima, F. L. A.; Bettarello, A.; Neves, D. P. (Clinica de Gastroenterologia, Depart. de Clin. Medica da FMUSP., Sao Paulo, Brazil). *Rev. Hosp. Clin. Fac. Med. Sao Paulo* 32(1):63-66; 1977.

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3980 HYPOTHERMIC TREATMENT OF EXACERBATED ULCER WITH COLD MILK. PRELIMINARY REPORT. (Ger.) Bsteh, O. (Liechtensteinstrasse 31, A-2130 Mistelbach, Austria). *Wien. Med. Wochenschr.* 127(13):422-424; 1977.

3981 EXPERIENCE WITH SURGICAL TREATMENT OF PATIENTS WITH COMPLICATED FORMS OF PEPTIC ULCER. (Rus.) Savchenko, A. A.; Salkov, G. M. (Zhitomir Oblast Hosp., Zhitomir, USSR). *Klin. Khir.* (3):57-59; 1977.

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3983 EXPERIENCE WITH SURGICAL TREATMENT OF PATIENTS WITH RECURRENCES OF PEPTIC ULCER OF THE ANASTOMOSIS. (Rus.) Spivak, V. P.; Bondarenko, P. G. (Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Klin. Khir.* (3):37-39; 1977.

3984 BILATERAL TRUNCAL VAGOTOMY WITH PYLOROPLASTY IN THE TREATMENT OF DUODENAL ULCER. (Ita.) Taschieri, A. M.; Percio, F. M.; Contessini Avesani, E.; Mezzetti, M.; Scortecci, V. (Istituto di Patologia Chirurgica 2a, Universita delgi Studi di Milano, Milano, Italy). *Arch. Ital. Chir.* 100(2): 167-171; 1977.

3985 MANOMETRIC INVESTIGATIONS ON THE INFLUENCE OF SELECTIVE PROXIMAL VAGOTOMY ON THE LOWER ESOPHAGEAL SPHINCTER. (Ger.) Witte, J.; Zumtobel, V.; Rattenhuber, U.; Londong, W.; Feifel, G.; Lang, G.; *et al.* (Chirurgische Klinik der Universitat Munchen, Nussbaumstrasse 20, D-8000 Munchen 2, W. Germany). *Z. Gastroenterol.* 15(4):231-236; 1977.

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3987 25-HYDROXYVITAMIN-D_3 SERUM LEVEL FOLLOWING BILLROTH II GASTRIC RESECTION IN PATIENTS WITH GASTRIC OR DUODENAL ULCER. (Ger.) Sonnenberg, A.; Sonnenberg, G. E.; v. Lillienfeld-Toal, H.; Strohmeyer, G. (Stadtspital Triemli, Birmensdorfer Strasse 497, CH-8063 Zurich, Switzerland). *Z. Gastroenterol.* 15(4):237-239; 1977.

3988 PROTEIN METABOLISM FOLLOWING GASTRIC RESECTION. (Ger.) Beno, I.; Chorvathova, V.; Cerven, J. (Ernahrungsforschungsinstitut, Namestie 4, aprila 7, 88030 Bratislava, Czechoslovakia). *Dtsch. Z. Verdau. Stoffwechselkr.* 36(5/6):263-267; 1976.

STOMACH

3989 EFFECT OF ELECTROSTIMULATION OF THE GASTROINTESTINAL TRACT ON HEMOSTATIC CHANGES FOLLOWING SURGERY FOR ULCER DISEASE. (Rus.) Chetverikova, V. N.; Shtuchnaya, L. P.; Starodubtseva, I. S.; Titarenko, A. A. (Dnepropetrovsk Medical Inst., Dnepropetrovsk, USSR). *Klin. Khir.* (3):23-28; 1977.

See also, 3481, 3553, 3563, 3825, 3881, 3892, 3896, 3929, 3936, 3937, 3940, 3943, 3958, 4234.

SMALL INTESTINE

3990 FACTORS INFLUENCING SMALL BOWEL CHANGES IN DERMATITIS HERPETIFORMIS. (Eng.) Roberts-Thomson, I. C.; Stevens, D. P.; Michel, B.; Braun, W. E.; Morris, P. J.; Wall, A. J.; *et al.* (Royal Melbourne Hosp., Victoria 3050, Australia). *Aust. N.Z. J. Med.* 7(4):356-362; 1977.

Factors influencing small bowel morphology in dermatitis herpetiformis (DH) were investigated by comparing 9 patients with DH and normal small bowel biopsies with 18 patients with DH and abnormal small bowel biopsies. The mean age of the patients with morphological changes in small bowel (38 yr) was significantly lower ($p<0.001$) than that of the patients with normal bowel mucosa (60 yr). Histocompatibility locus antigen (HLA) typing confirmed the high frequency of HLA-B8 in DH (64%), but HLA-B8 was unrelated to the presence or severity of small bowel lesions. Four patients had diarrhea with progressive weight loss or abdominal cramps subsequently responsive to gluten withdrawal. In this subgroup, serum IgG and IgM levels were significantly lower than in patients with normal small bowel mucosa. Small bowel involvement appeared to be independent of the duration and severity of skin disease, and the deposition of immunoglobulin and complement (C3) in the dermal papillae of skin adjacent to skin lesions. The relation between age and small bowel morphology in DH has not been noted previously.

3991 SYMPTOMATIC INTESTINAL DISACCHARIDASE DEFICIENCY IN ALCOHOLICS. (Eng.) Perlow, W.; Baraona, E.; Lieber, C. S. (Veterans Admin. Hosp., 130 W. Kingsbridge Rd., Bronx, NY 10468). *Gastroenterology* 72(4, Part 1):680-684; 1977.

3992 ARTERIOGRAPHY OF A BLEEDING DUODENAL DIVERTICULUM. (Eng.) Ghahremani, G. G.; Hietala, S. O. (Evanston Hosp., 2650 Ridge Ave., Evanston, IL 60201). *Am. J. Dig. Dis.* 22(5):445-448; 1977.

3993 PERFORATED PERIVATERIAN DUODENAL DIVERTICULITIS. (Eng.) Widdershoven, G. M. J. (Elisabeth Ziekenhuis, Sluiskil, Netherlands). *Arch. Chir. Neerl.* 29(2):153-157; 1977.

3994 PREOPERATIVE RADIOGRAPHIC DIAGNOSIS OF A SPIGELIAN HERNIA CONTAINING LARGE AND SMALL BOWEL. (Eng.) Hunter, T. B.; Freundlich, I. M.; Zukoski, C. F. (Univ. Arizona Medical Center, Tucson, AZ 85724). *Gastrointest. Radiol.* 1(4):379-381; 1977.

3995 TERMINAL ILEITIS: Yersinia enterocolitica ISOLATED FROM FAECES. (Eng.) Doraiswamy, N. V.; Currie, A. B. M.; Gray, J.; Lynton-Moll, C.; Mair, N. S. (East Birmingham Hosp., Birmingham B9 5ST, England). *Br. Med. J.* 2(6078):23; 1977.

3996 ACUTE TERMINAL ILEITIS AND Yersinia entercolitica INFECTION [Abstract]. (Eng.) Kato, Y.; Hattori, T. (Nagoya Univ. Sch. Medicine, Nagoya, Japan). *Gastroenterol. Jpn.* 12(1):95-96; 1977.

3997 FATAL HEPATIC FAILURE AFTER JEJUNOILEAL BYPASS. CLINICAL AND LABORATORY EVIDENCE OF PROGNOSTIC SIGNIFICANCE. (Eng.) Weismann, R. E.; Johnson, R. E. (Hitchcock Clinic, Hanover, NH 03755). *Am. J. Surg.* 134(2):253-258; 1977.

3998 PROGRESSIVE RENAL FAILURE WITH HYPEROXALURIA: A NEW COMPLICATION OF JEJUNOILEAL BYPASS [Abstract]. (Eng.) Earnest, D.; Campbell, J.; Hunt, T. K.; Naughton, J. (Univ. California Sch. Medicine, San Francisco, CA). *Gastroenterology* 72(5, Part 2):1054; 1977.

3999 PREGNANCY AFTER JEJUNOILEAL SHUNT. (Eng.) Stenning, H.; Campbell, R.; Brake, I.; Anderson, J. (Women's Hosp., Crown St., Surry Hills, New South Wales 2010, Australia). *Med. J. Aust.* 1(21):781-782; 1977.

4000 PLEXIFORM NEUROFIBROMATOSIS OF THE ILEUM IN AN INFANT. (Eng.) Takahashi, M.; Katsumata, K.; Yokoyama, J.; Yokoyama, S.; Mikata, A. (Keio Univ. Sch. Medicine, Shinanomachi-35, Shinjuku, Tokyo, Japan). *J. Pediatr. Surg.* 12(4):571-574; 1977.

4001 NONTRAUMATIC PERFORATIONS OF THE SMALL INTESTINE. (Eng.) Huttunen, R.; Kairaluoma, M. I.; Mokka, R. E.; Larmi, T. K. I. (Dept. Surgery, Univ. Oulu, 90220 Oulu 22, Finland). *Surgery* 81(2):184-188; 1977.

4002 OSTEOMALACIA IN THE STAGNANT LOOP SYNDROME. (Eng.) Schjonsby, H. (Medical Dept. A, Univ. Clinic, Bergen, Norway). *Acta Med. Scand.* (Suppl. 603):39-41; 1977.

See also, 3763, 3780, 3798, 3814, 3816, 3821, 3841, 3852, 3859, 3860, 3866, 3889, 3892, 3896, 3922, 3937, 3945, 3970, 3973, 3981, 4009, 4013, 4045, 4049, 4235, 4236, 4238, 4240, 4243, 4257, 4259, 4260, 4262, 4264, 4275, 4279, 4281.

SMALL INTESTINE

Malabsorption

4003 ASSOCIATION OF PRECIPITINS AND COELIAC DISEASE. (Eng.) Kavai, M.; Csorba, S.; Szabolcs, M.; Jezerniczky, J.; Fesus, L.; Szabo, B. (Univ. Medical Sch., 4004 Debrecen, Hungary). *Acta Allergol. (Kbh.)* 32(6):395-405; 1977.

The blood antibody types were studied in the sera of 28 celiac patients and of controls in an effort to understand the induced reaction resulting in gluten intolerance in this disease. Four fractions (A, B, C, and D) were isolated from the cold (2-4 C) aqueous extract of wheat flour by Sephadex G-75 column fractionation. Fraction A (molecular weight, 36,000-61,000 daltons) reacted as an antigen with the sera of celiac patients. Its molecular weight and amino acid composition (particularly, the high quantities of glutamic acid and proline) were similar to those of gliadin. IgE exceeded the normal value only in 3 patients (601-1,000 IU/ml), whereas 14 patients had 200-600 IU IgE/ml and 11 patients had 100-200 IU IgE/ml. The heat-inactivated sera of the patients formed a precipitate with the homologous antigen in higher dilutions than did the sera from controls. On the basis of *in vitro* rat mast cell sensitizing capacity of the patients' sera, specific antigliadin IgE was only found in one out of the seven patients tested, and this was a patient with elevated IgE level. Sera containing high quantities of antibody (as shown by precipitation and passive hemagglutination assays) were compared before and after absorption by anti-IgG and anti-IgA for their ability to form precipitates with antigen (gliadin) and anti-IgG in immunodiffusion assays. Prior absorption by anti-IgG was more effective than prior absorption by anti-IgA in reducing the reaction of the sera with gliadin. The results are consistent with the conclusion that antibody produced against wheat-derived protein circulating in serum belongs mainly to the IgG class.

4004 IMMUNOLOGICAL ABNORMALITIES IN COELIAC DISEASE AND THEIR RESPONSE TO DIETARY RESTRICTION. I. SERUM IMMUNOGLOBULINS, ANTIBODIES AND COMPLEMENT. (Eng.) Ratnaike, R. N.; Wangel, A. G. (Queen Elizabeth Hosp., Woodville, South Australia 5011, Australia). *Aust. N.Z. J. Med.* 7(4):349-352; 1977.

In an effort to gain information on whether the immunological changes found in celiac disease are related to its pathogenesis, 23 patients with this disease were studied while on a normal diet and again after a mean period of 15 months on a gluten-free diet. Serum levels of IgG, IgA, and IgM, total hemolytic complement, complement component C3, serum autoantibodies, and precipitins to dietary proteins were compared with those in age- and sex-matched controls. There was considerable individual variation, but as a group, patients on a normal diet had raised IgA and low IgM levels and an increased prevalence of antibody to reticulin, smooth muscle, and dietary protein. These abnormalities disappeared during the period of dietary restriction, suggesting that they are disease epiphenomena rather than primary pathogenetic factors.

4005 IMMUNOLOGICAL ABNORMALITIES IN COELIAC DISEASE AND THEIR RESPONSE TO DIETARY RESTRICTION. II. IMMUNOGLOBULIN CONTAINING CELLS, IMMUNOGLOBULINS AND DIETARY ANTIBODIES IN THE SMALL BOWEL. (Eng.) Ratnaike, R. N.; Wilson, J.; Wangel, A. G. (Queen Elizabeth Hosp., Woodville, 5011 South Australia, Australia). *Aust. N.Z. J. Med.* 7(4): 353-355; 1977.

The numbers of immunoglobulin-containing cells in jejunal mucosa were determined in 29 patients with untreated celiac disease and 28 controls. The patients had significantly increased numbers of IgM-containing cells in comparison with controls ($p < 0.001$). Seven patients were studied again after 12 months on a gluten-free diet and showed a significant reduction in the number of IgM-containing cells in comparison with that when they were on the normal diet ($p < 0.025$). The increase noted in untreated patients is therefore likely to be a manifestation of the disease rather than a primary abnormality of etiological significance.

4006 LACTOSE INTOLERANCE, DETECTED BY THE HYDROGEN BREATH TEST, INFANTS AND CHILDREN

WITH CHRONIC DIARRHEA. (Eng.) Maffei, H. V. L.; Metz, G.; Bampoe, V.; Shiner, M.; Herman, S.; Brook, C. G. D. (Faculdade de Ciencias Medicas e Biologicas, 18600 Botucatu, Sao Paulo, Brazil). *Arch. Dis. Child.* 52(10):766-771; 1977.

The value of the hydrogen breath test (HBT), adapted for use in young infants and children, in the diagnosis of lactose malabsorption was assessed in 23 children aged 2.5 months to 13 yr with chronic diarrhea and 6 patients without diarrhea. A further eight children with proven or suspected celiac disease were also investigated. The HBT was compared with the histology of the jejunal mucosa, mucosal lactase estimations, a lactose tolerance test, symptoms during the test, and follow-up after starting a lactose-free diet. The six patients without diarrhea showed no evidence of hypolactasia and the hydrogen concentration on the HBT was below 7 ppm, a level considered to be clinically nonsignificant. Twelve of the 23 patients with diarrhea had a breath H_2 concentration greater than 24 ppm, and this correlated well with their clinical symptoms during or after the test and with the remission of the diarrhea after lactose withdrawal. Of the remaining 11 patients with diarrhea whose breath H_2 concentration was lower than 25 ppm, symptoms did not improve when a lactose-free diet was started in 3, while a further 4 improved on a full diet. There was poor correlation between the HBT and the findings on the jejunal mucosal specimens. All but one of the celiac patients had an HBT less than 20 ppm, and none of these required lactose withdrawal for remission of symptoms. The HBT is a noninvasive test particularly suitable for outpatients, and it gives a useful prognostic guide to the efficacy of lactose-free diet in the treatment of chronic diarrhea in children.

4007 GASTRIC EMPTYING OF LACTOSE AND MILK IN SUBJECTS WITH LACTOSE MALABSORPTION. (Eng.) Welsh, J. D.; Hall, W. H. (Univ. Oklahoma Health Sciences Center, P.O. Box 26901, Oklahoma City, OK 73190). *Am. J. Dig. Dis.* 22(12):1060-1063; 1977.

Gastric emptying tests with 750-ml meals of glucose in water, lactose in water, plain milk, and chocolate milk were carried out in six lactose absorbers (LA) and five lactose malabsorbers (LM). The glucose and lactose meals emptied in a similar fashion in LA and LM subjects with a significant decrease in gastric emptying as the osmolarity of the meals was doubled. If the data were normalized by dividing lactose emptying by the emptying of glucose meals of twice the osmolality in each individual, the lactose malabsorbers emptied significantly more lactose ($p<0.01$). Both LA and LM subjects emptied comparable amounts of milk meals having similar osmolarity. Chocolate milk, which had a higher osmolality than plain milk, emptied more slowly than plain milk in both groups, and this difference was significant ($p<0.01$) in the LM group. In LM individuals, chocolate milk, in addition to fermented dairy products, should be tried as alternatives to total abstinance from dairy products.

4008 PRIMARY ABDOMINAL LYMPHOMA: PRESENTING MANIFESTATION OF CELIAC SPRUE OR COMPLICATING DERMATITIS HERPETIFORMIS. (Eng.) Freeman, H. J.; Weinstein, W. M.; Shnitka, T. K.; Piercey, J. R. A.; Wensel, R. H. (Dept. Medicine, Univ. Alberta, Edmonton, Alberta T6G 2G3, Canada). *Am. J. Med.* 63(4):585-594; 1977.

The association between primary abdominal lymphoma and celiac sprue or dermatitis herpetiformis was examined. During a 4-yr period, seven patients with abdominal lymphoma were found on subsequent investigation to have celiac sprue or the closely linked disorder, dermatitis herpetiformis. Five patients had a small intestinal lymphoma, one had a gastric lymphoma, and one had a retroperitoneal lymphoma. Histologically, six of the seven tumors were of a diffuse histiocytic type, and one was undifferentiated. In four patients, the ulcerating small intestinal lymphoma was initially misinterpreted as "benign ulcerative nongranulomatous jejunoileitis," a condition also reported to complicate celiac sprue. In several patients, the associated celiac sprue was clinically occult and could readily have been missed. The celiac sprue was fully responsive in five of the patients who were treated with a gluten-free diet. These studies suggest that celiac sprue and abdominal lymphoma occur together more often than is currently appreciated. The frequency of this association may be overlooked for two reasons: the associated celiac sprue is sometimes mild and may remain undetected, and early ulcerative intestinal lymphoma may be mistaken for benign ulcerative nongranulomatous jejunoileitis. Patients with abdominal lymphoma should be investigated for celiac sprue and for dermatitis herpetiformis.

4009 INTESTINAL LYMPHOMA ASSOCIATED WITH MALABSORPTION. (Eng.) Isaacson, P.; Wright, D. H. (Southampton Univ. Hosp., Southampton SO9 4XY, England). *Lancet* 1(8055):67-70; 1978.

Clinical findings in 18 patients with small intestinal lymphoma associated with villous atrophy and crypt hyperplasia of uninvolved mucosa are presented. Most patients presented with acute obstruction or perforation preceded by abdominal pain and weight loss. However, malabsorption, thought to be adult celiac disease, preceded the diagnosis of lymphoma in five cases. The lymphomas were composed of malignant histiocytes and were classified on morphological grounds as malignant histiocytosis. Immunohistochemical techniques revealed that all major immunoglobulin classes were present within malignant cells of single tumors. Characterization of this group of lymphomas as a specific entity should help in the further understanding of the relationship of malabsorption and lymphoma and in the rationalization of treatment.

4010 MACROGLOBULINEMIA AND MALABSORPTION. (Eng.) Tubbs, R. R.; McLaughlin, J. P.; Winkelman, E. I.; Deodhar, S. D.; Hewlett, J. S. (Cleveland Clinic, Cleveland, OH). *Cleve. Clin. Q.* 44(4):189-191; 1977.

Intestinal involvement in Waldenstrom's macroglobulinemia (IgM monoclonal [kappa] gammopathy) in a 58-yr-old woman is presented because the phenomenon is rare in this disease. The patient had been treated for anemia (symptoms of fatigue, weakness, and weight loss) with low-fat diet, prednisone (30 mg/day), and thyroid USP (3 grains/day), had undergone an exploratory laparotomy that disclosed lymphangiectasia of the intestinal lymphatics and mesenteric lymph nodes, and was treated with cyclophosphamide (50 mg p.o. twice daily) and prednisone (60 mg p.o. every other day) to resolve malabsorption, splenomegaly, IgM monoclonal (kappa) gammopathy, anorexia, and weight loss. The patient was hospitalized for pneumonia (resolved with cephalothin) and then for hyperpyrexia, athralgias, visual disturbances, anemia, and leukopenia; *Staphylococcus aureus* bacteremia was found. The patient died despite reverse isolation, several transfusions, and antibiotic therapy with multiple antimicrobial agents. Histologically, at necropsy, the gallbladder contained a moderate mucosal and submucosal chronic inflammatory infiltrate. The jejunum, mesentery, and mesenteric lymph nodes demonstrated a marked lymphectasia. Additionally, necropsy tissues revealed severe organizing bronchopneumonia and focal myocardial fibrosis. A mixed diffuse infiltrate of mature lymphocytes, plasma cells, plasmacytoid lymphocytes, and occasional lymphoid cells with Dutcher bodies was present in lung, bone marrow, spleen, and lymph nodes. Deposition of all immunoglobulin heavy chains and both light chains within the inspissated material in dilated submucosal lymphatics and intestinal lacteals was shown. There was no extracellular deposition of IgM within the small bowel other than within the dilated lymphatic channels. It appears that mucosal deposition of the monoclonal immunoglobulin is the primary pathogenetic mechanism, and that obstruction and stasis of lymphatic circulation due to effacement of mesenteric lymph nodes by the malignant infiltrate are of primary importance in the pathogenesis of the lesion.

4011 PATHOPHYSIOLOGY AND CLINICAL ASPECTS OF MALASSIMILATION. (Ger.) Classen, M.; Hoffmann, L. (I. Medizinische Abteilung, Allgemeines Krankenhaus Barmbek, Rubenkamp 148, D-2000 Hamburg 60, W. Germany). *Med. Klin.* 72(13):533-541; 1977.

4012 POSSIBILITIES OF SURGICAL TREATMENT OF MALASSIMILATION. (Ger.) Farthmann, E. (Chirurgische Universitatsklinik, Abteilung fur Allgemeinchirurgie, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Med. Klin.* 72(13):542-548; 1977.

4013 INFANTILE INTESTINAL ENZYMOPATHY. (Ita.) Schreier, K. (Municipal Pediatric Clinic, Nurnberg, W. Germany). *Minerva Med.* 68(15):951-959; 1977.

See also, 3490, 3809, 3841, 3865, 3866, 3874, 3884, 3897, 4000, 4262, 4275, 4285.

LARGE INTESTINE

4014 APPENDICEAL ABSCESS REVISITED. (Eng.) Bradley, E. L., III; Isaacs, J. (Emory Univ. Sch. Medicine, 69 Butler St. SE, Atlanta, GA 30303). *Arch. Surg.* 113(2):130-132; 1978.

The occurrence of appendiceal abscess was reviewed for the period 1962-1976. Two percent of 2,621 patients with acute appendicitis developed appendiceal abscess. Sixty-one of 68 patients underwent surgical drainage of the abscess, with a 28% complication rate. Interval appendectomy was performed in 42 cases, with a 19% complication rate. Two patients died. These rates do not differ appreciably from those reported during the pre-antibiotic era. Recurrent appendicitis developed in only 1 of 13 patients not undergoing interval appendectomy during a follow-up period averaging 5 yr. Interval appendectomy should be withheld only in those poor-risk patients in whom the 10% to 20% incidence of recurrent appendicitis seems the smaller risk. Although the number of patients developing appendiceal abscess represents a decline in frequency from earlier studies, further decreases in incidence could be effected by increased patient education.

4015 POLICY OF LOCAL EXCISION FOR EARLY CANCER OF THE COLORECTUM. (Eng.) Morson, B. C.; Bussey, H. J. R.; Samoorian, S. (St. Mark's Hosp., London, England). *Gut* 18(12):1045-1050; 1977.

The results of local excisions performed over a 25-yr period in 143 patients with cancer of the rectum and distal colon are described to evaluate a policy of local excision or total biopsy for certain selected colorectal cancers. Many of the lesions presented as malignant polyps. All procedures were followed by a thorough histological examination to evaluate the need for further radical operation. The grade of the malignancy was low in 60 cases, average in 77, and high in 6. The tumor diameter was <2 cm in 86 cases, 2-3 cm in 26, 3-4 cm in 15, and >5 cm in 5. In 115 patients, the carcinoma did not spread beyond the submucosa of the rectal or colonic wall. In 20 cases, it penetrated into the muscularis propria and in 7 cases it reached the extramural tissue. In 102 patients, the local excision was regarded as histologically complete with 91/102 accomplished by local excision only; recurrence was observed in only 3 of the 91 patients and one of these must be regarded as a failure of the policy. In eight cases, the local excision was followed by a major operation because the local excision was suspected to be incomplete; only two patients from this group died 2 and 3.5 yr after treatment with evidence of recurrence, and the evidence indicates that these were not policy failures. In 14 of 18 patients with doubtfully complete local excision, no further operation was performed for various reasons; there was evidence of recurrence in only 2 cases, and these were classed as policy failures. In four patients with doubtfully complete local excision, a major operation was performed that showed residual tumor growth at the site of local excision in two cases, moderately differentiated carcinoma spreading into muscularis propria or submucosa in two cases, and no residual tumor in the other two cases. In 23 cases the local excision was regarded as histologically incomplete; 14/23 had had palliative local excisions and were not subjected to further surgical treatment due to various contraindications; only 5 recurrences were observed. Residual tumor growth was found in only three of the nine patients who had a major operation following incomplete local excision. The crude and corrected 5-yr survival rates for patients with complete, doubtfully complete, and incomplete local excisions were 82% and 100%, 64% and 96%, and 57% and 83%, resp. Because of the good results, local excision should be regarded as an established alternative to partial colectomy, anterior resection, and abdominoperineal excision in carefully selected patients.

4016 TUMOR-HOST RELATIONSHIPS IN COLORECTAL CARCINOMA.

(Eng.) Syrjanen, K. J.; Hjelt, L. H. (Jorvi Hosp., 02740, Espoo 74, Finland). *Dis. Colon Rectum* 21(1):29-36; 1978.

Histological studies of colorectal carcinoma, its surrounding stroma, and regional lymph nodes with special reference to the morphology of possible tumor-host relationships were performed in 87 consecutive patients and 5-year follow-ups completed for 74 patients. The tumors were graded according to the nuclear structure as slight nuclear atypia (grade I), moderate atypia (grade II), strong atypia (grade III), and profound atypia (grade IV). Tumor-derived mucus content was estimated as low, moderate, or high. The stromal lymphocyte and mast cell reactions and the mast cell reaction in the nodes were graded weak, moderate, or strong. Lymph node follicular hyperplasia was classified from 0 to 4 based on the number of follicles seen. Paracortical activity was graded into three classes on the basis of the small lymphocyte content, the height of the endothelial cells of the postcapillary venules, and the occurrence of lymphocytes in their lumena. Sinus reactions were classified as sinus histiocytosis, degenerative sinus histiocytosis, nonspecific sinus reactions, and no sinus reactions. The extent of metastases was graded from 1 to 4 according to the node area invaded by the tumor. A direct correlation was found between tumor grade and the 5-yr prognosis, although the sample size was too small for statistical analysis. Five-year survival was 100%, 50.0%, 36.7%, and 16.7% for patients with tumors graded I-IV, resp. Metastases were more frequent in patients with grade IV and grade III tumors (50% and 43.5%, resp.) than in those with grade II or grade I tumors (7.1% and 0.0%, resp.), and prognosis appears poorer for those with nodal metastases. Regardless of tumor grade, 5-yr survival rates seem to be independent of the mucous content. There appears to be a direct positive correlation between stromal lymphocyte reaction and the 5-yr survival rate. A similar correlation, although not so strong, was observed between the prognosis and the mast cell reaction. Follicular hyperplasia of lymph nodes did not correlate with the appearance of nodal metastases. The latter was, however, inversely correlated with paracortical activity. Sinus histiocytosis was never associated with nodal metastases. It is concluded that complex factors of both tumor and host origin modify local invasiveness of colorectal carcinoma and greatly affect the prognosis.

4017 CHEMOPROPHYLAXIS FOR PATIENTS WITH POST-OPERATIVE HIGH RISK COLORECTAL CANCER.

(Eng.) Li, M. C.; Ross, S. T. *In: Adjuvant Therapy of Cancer.* (Amsterdam: Elsevier/North-Holland Biomedical Press): 273-277; 1977.

The effectiveness of short-term fluorouracil (FU) chemoprophylaxis begun 4-6 weeks after curative surgery was evaluated in 183 patients with Duke's class B or C colorectal cancer who were operated on between 1965 and 1970. The controls were a group of similar patients operated on between 1960 and 1965 but who did not receive the drug. Patients <65 yr old, >60 kg in weight, or in good nutritional state received 1,000 mg FU i.v. push on day 1, 500 mg i.v. for the next 4 days, and then 500 mg i.v. once after 4 weeks. Patients >65 yr old, <60 kg in weight, or in poor nutritional state received FU (500 mg, i.v. push) for 5 days and one repeat dose after 4 weeks. The 5-yr survival rate is calculated for patients with no evidence of disease (NED). In Duke's class C disease, the rate was 24.3% with surgery alone, but was 57.7% ($p<0.01$) when treatment followed surgery. The 5-year NED rate in Duke's class B disease was 58.8% with surgery alone and 81.6% ($p<0.02$) with surgery and FU treatment. The 1-, 2-, and 3-yr survival rates in Duke's class C disease are strikingly different for the experimental and control groups, but the difference in Duke's class B disease was not significant until the 5th yr. FU therapy appears to offer a statistically significant improvement in the 5-yr disease-free survival rates of patients with Duke's class B or C disease when used in a carefully selected and controlled setting.

4018 LEIOMYOMAS OF THE RECTUM AND ANAL CANAL: REPORT OF SIX CASES AND REVIEW OF THE LITERATURE.

(Eng.) Kusminsky, R. E.; Bailey, W. (6064 Village Glen Drive, Apt. 4153, Dallas, Texas 75206). *Dis. Colon Rectum* 20(7):580-599; 1977.

A review is presented of 79 cases of leiomyoma of the rectum and anal canal reported in literature from 1959 to 1975, of which six cases (author's series) are presented in detail. The patient's age and sex, the size and location of the tumor, the symptoms of the lesion and their duration, the preoperative diagnosis, treatment, and follow-up comments are presented in tabular form for the 79 cases. Since 1872, 168 rectal leiomyomas have been reported in the literature, indicating a very low incidence of the disease. The incidence, etiology, location, age and sex incidence, signs and symptoms, diagnosis, pathology, and treatment of the disease are discussed. The incidence of these lesions is greatest between the ages of 40 and 59 yr. Leiomyomas located in the anal canal and sphincter are the rarest (a case report is given; 11 cases total are found in the literature). Most patients have a combination of symptoms among which most frequent are the presence of a palpable mass, bleeding, constipation, and pain. Diagnosis is usually obtained by digital examination of the rectum. Those tumors with an original diameter of 5 cm or more show a stronger tendency to recur and/or become malignant. It is concluded that leiomyomas must be approached with serious consideration of radical treatment, particularly when their largest diameter is 5 cm or more. More adequate follow-up studies of these patients are suggested.

4019 THE PATHOPHYSIOLOGIC BASIS FOR THE ANGIOGRAPHIC SIGNS OF VASCULAR ECTASIAS OF THE COLON.

(Eng.) Boley, S. J.; Sprayregen, S.; Sammartano, R. J.: Adams, A.; Kleinhaus, S. (Montefiore Hosp. and Medical Center, 111 East 210th St., Bronx, NY 10467). *Radiology* 125(3):615-621; 1977.

Forty-five superior mesenteric angiograms from 25 patients with histologically and radiographically diagnosed colonic ectasia were reviewed to determine reliable individual diagnostic signs. Of eight angiographic signs evaluated, four were considered important, reliable, and readily identifiable, independent of observer interpretation: (1) a densely opacified, slowly emptying, dilated, tortuous, intramural cecal vein that remains visualized after other mesenteric veins have emptied (seen in 23 of the 25 patients); (2) a vascular tuft, best visualized in the arterial phase and usually located at the termination of a branch of the ileocolic artery (seen in 17); (3) an early filling vein that visualized within 4-5 sec (seen in 14), usually a local vein in the cecum or right colon or the ileocolic vein; and (4) an intraluminal, localized extravasation of contrast material that usually appeared during the arterial phase and persisted throughout the study (seen in 2). The first three signs were present in 11 of the 25 patients. Eight patients displayed combinations of two signs. Five patients demonstrated only the dense, slowly emptying vein, and one patient had only the early filling vein. In serial angiograms done on three of four patients, the late emptying intramural vein was found months to years before the other signs could be identified; it was the earliest and most frequently observed angiographic sign of ectasia. The vascular tuft was a less frequent sign that developed next on the serial angiograms and appears to represent a more advanced stage of the degenerative process. The early filling vein corresponds to the final stage of the process. Vascular ectasias appear to be degenerative lesions requiring many years to develop, the direct cause of which appears to be repeated, partial, intermittent, low-grade obstruction of the submucosal veins, especially where they pierce the muscle layers of the colon. Dilatation and tortuosity of the submucosal vein and then of the venules of the arteriolar-capillary-venular units draining into it occurs, leading to alterations in the arteries supplying the area and the extramural vein draining it.

4020 HISTOLOGIC STUDIES OF RECTOCOLIC AGANGLIONOSIS AND ALLIED DISEASES.

(Eng.) Munakata, K.; Okabe, I.; Morita, K. (Nihon Univ. Sch. Medicine, Oyaguchi, Itabashi-ku, Tokyo, Japan). *J. Pediatr. Surg.* 13(1):67-75; 1978.

Histologic studies of the rectum and large bowel of newborn children with provisional clinical diagnosis of Hirschsprung's disease were performed using a silver impregnation technique. The state of maturity of the ganglia was defined by studying intestinal specimens obtained at operation for aganglionosis in two fetuses and for disease other than Hirschsprung's in two newborn infants. The normal state of the internal anal sphincter was studied in rectal autopsy specimens from two suckling infants and one newborn, none of whom had defecation problems. In the fetuses and newborn infants, Auerbach's plexus was rhombic in form, and the number of ganglia/plexus was about 50. No ganglion cells were found, and many nonmedullated nerve fibers were present in aganglionic segments. Solitary or clustered ganglia and proliferations of nonmedullated nerve fibers were present in the distal portion of the transitional zone. A small number of ganglia per plexus were found in the proximal part of the transitional zone, and a complete plexus was present in the proximal normal intestine. In children aged 6-9 months, Auerbach's plexus exhibited a network structure up to about 2 mm proximally from the lowest part of the internal anal sphincter, and in the newborn infants up to about 4 mm proximally; nerve fibers branched off from these plexuses and ran towards the internal anal sphincters. In 30 newborn infants diagnosed to have Hirschsprung's disease, double rectal suction biopsies were performed following colostomy or ileostomy; 8 of them had further biopsies at 6-9 months. In 22 cases, many or slight proliferations of acetylcholinesterase nerve fibers were observed; in 8 cases, however, hardly any proliferation was recognized, and small ganglia were present. Detailed histologic examination of the bowel, with silver impregnation, revealed that six of these eight cases were hypoganglionic. In five cases, there was no plexus formation but solitary or clustering ganglia were present. In one patient, there was incomplete formation of the plexus and ganglia were observed. Complete plexus gradually formed in proximal intestine in all six cases; in four cases, the diseased segment was short, involving only the rectum and in two cases, it extended to the middle of the descending colon. Proliferation of acetylcholinesterase nerve fibers was rarely observed in the lamina propria or lamina muscularis mucosae of rectal biopsies in the newborns, but these arose by 6-9 months. Small Meisner's ganglia were present in all newborn rectal biopsies. Immaturity of the ganglia (long type) was recognized in a newborn infant who had aganglionosis in the rectum, normal ganglia in the transverse colon, and scarsely any acetylcholinesterase nerve fibers in the lamina propria or lamina muscularis mucosae. Plexus formation and numbers of ganglia corresponded to controls, but the intramural ganglion cells were small and monopolar from the jejunum to the rectum. Despite intravenous hyperalimentation, the patient died 4 months after birth. A patient with microcolon and aganglionic small bowel had no acetylcholinesterase nerve fibers in a rectal biopsy specimen, although small Meisner's ganglia were present. Histologic examination of intestinal autopsy specimens showed a narrow plexus, diminished numbers of ganglia per plexus, and small ganglia from jejunum to anus. It is suggested that the internal anal sphincter muscle at the dentate line is under the control of Auerbach's plexus and ganglia. Hypoganglionosis can be diagnosed as Hirschsprung's disease from the characteristic findings of acetylcholinesterase nerve fibers in the rectal mucosa, but immaturity of the ganglia and hypogenesis can only be diagnosed by histologic studies that include studies of the form of the intramural plexus, the numbers of ganglia per plexus, and the size of the ganglia.

4021 HISTOCOMPATIBILITY ANTIGENS AND THE ARTHRITIS OF CHRONIC INFLAMMATORY BOWEL DISEASE.

(Eng.) Nicholls, A. (No affiliation given). *Clin. Rheum. Dis.* 3(2):265-280; 1977.

Various types of arthritis associated with ulcerative colitis (UC) and Crohn's disease (CD) are discussed and epidemiological and genetic studies are reviewed to investigate whether other conditions associated with ankylosing spondylitis also have a high frequency of the HLA-B27 antigen. Arthritis associated with chronic inflammatory bowel disease, family associations between chronic inflammatory bowel disease and ankylosing spondylitis, the occurrence of spinal disease in patients and relatives of patients with inflammatory bowel disease, HLA antigens in inflammatory bowel disease and its accompanying arthritis, HLA antigens in the arthritis of inflammatory bowel disease, other genetic markers (blood groups, glucose-6-phosphate dehydrogenase activity, allergic diseases, infective agents), and genetic interpretation are discussed in detail. No definite association has been shown between the distribution of HLA antigens and CD, UC, or the enteropathic arthritis complicating these diseases. HLA-B27 is present in a high proportion of patients with spondylitis complicating inflammatory bowel disease; but not as high as in "idiopathic" ankylosing spondylitis. It is suggested that the presence of B27 in a patient with inflammatory bowel disease confers a greater risk of the development of ankylosing spondylitis than in subjects without bowel disease.

4022 MANAGEMENT OF VOLVULUS OF THE COLON.

(Eng.) Wertkin, M. G.; Aufses, A. H., Jr. (Box 764, Mount Sinai Hosp., Fifth Ave. and 100th St., New York, NY 10029). *Dis. Colon Rectum* 21(1): 40-45; 1978.

The cases of 32 patients with sigmoidal (23), cecal (8), or transverse (1) volvulus of the colon are reviewed and compared with previously reported series in an attempt to define guidelines for the treatment of this entity. In the sigmoidal volvulus group, there were cases of significant neurologic or psychiatric disease (6), cardiovascular disease (7), diabetes mellitus (2), prostatic disease (4), and ulcerative colitis quiescent at the time of volvulus (1). Nonoperative reduction (attempted in 18 patients) was successful with sigmoidoscopy (12), colonoscopy (3), or barium enema (1); it was unsuccessful by sigmoidoscopy in two patients, one of whom died of shock following sigmoid perforation, and there were five recurrences. Fifteen patients underwent 16 operative procedures: 7 emergency treatments (obstructive resection in 5), three-stage resection in 1, detorsion and sigmoidopexy in 1, and 9 elective treatments (sigmoidal resection with primary anastomosis in 8 and obstructive resection in 1). There was one recurrence and one death. In the cecal volvulus group, there were cases of significant cardiovascular disease (2), chronic obstructive pulmonary disease (1), sickle-cell anemia (1), previously diagnosed irritable bowel syndrome (1), previous appendectomy (1), and previous cholecystectomy (1). Nonoperative treatment (attempted in 3 patients) was successful by barium enema (2) and unsuccessful by long intestinal tube (1). Six patients underwent operative procedures, with no deaths and no recurrences. Detorsion (2); detorsion, cecopexy, and cecostomy (2); detorsion and cecopexy (1); and detorsion and cecostomy (1) were performed on an emergency basis, except for one detorsion. Transverse volvulus accompanied by gangrenous bowel was successfully treated operatively. In all cases of sigmoidal volvulus, sigmoidal resection with primary anastomosis after nonoperative reduction is the treatment of choice; obstructive resection is indicated as definitive therapy where operation is mandatory. Appropriate operation appears the treatment of choice for cecal volvulus. The treatment of choice for volvulus of the transverse colon is resection of the redundant segment of colon with end-to-end anastomosis or obstructive resection in the presence of gangrenous bowel or when anastomosis is deemed hazardous.

4023 THE IMMEDIATE RESULTS OF ABDOMINAL PROCTECTOMY WITH DOWNWARD TRANSPOSITION OF THE SIGMOID IN OBESE AND ELDERLY PATIENTS.

(Rus.)

Fedorov, V. D.; Pokrovskii, G. A.; Brusilovskii, M. I.; Odaryuk, T. S. (Scientific Res. Lab. Proctology with Clinic, Moscow, USSR). *Khirurgiia (Mosk.)* (10):57-61; 1977.

4024 INCOMPETENCE OF ANASTOMOSIS IN ABDOMINAL RESECTION OF THE RECTUM AND SIGMOID FOR CANCER. (Rus.) Martynyuk, V. V. (N. N. Petrov Scientific Res. Inst. Oncology, Leningrad, USSR). *Khirurgiia (Mosk.)* (10):61-64; 1977.

4025 SURGICAL TREATMENT OF RECTOSIGMOID CANCER. (Rus.) Knysh, V. I.; Yudin, I. Yu.; Nurov, A. U.; Ivanov, V. M.; Tasryuk, V. F. (Oncological Science Center, Moscow, USSR). *Khirurgiia (Mosk.)* (10):65-69; 1977.

4026 COMBINED TREATMENT OF IMMOBILE RECTAL CANCER WITH THE USE OF PREOPERATIVE INTENSIVE FRACTIONAL IRRADIATION. (Rus.) Zybina, M. A.; Chernichenko, V. A.; Lurye-Pokrovskaya, T. A.; Arungazyeva, V. V.; Zaichuk, A. I. (Kiev Rentgeno-Radiology and Oncology Inst., Kiev, USSR). *Khirurgiia (Mosk.)* (10):72-76; 1977.

4027 PREOPERATIVE PREPARATION OF RECTAL CANCER PATIENTS WITH CONCOMITANT ARTERIAL HYPERTENSION. (Rus.) Brusilovsky, M. N.; Eropkina, A. G.; Eropkin, P. V.; Alexeeva, V. V. (Surgical Div., Scientific Res. Lab. Proctology with Clinic, Moscow, USSR). *Khirurgiia (Mosk.)* (10):77-81; 1977.

4028 PRINCIPLES OF PLANNING A POSTSURGERY REHABILITATION PROGRAM FOR RECTAL CANCER PATIENTS. (Rus.) Gerasimenko, V. N.; Protchenko, N. V.; Artyushenko, Yu. V.; Gegenava, Sh. P. (Div. Rehabilitation, Oncological Science Center, Acad. Medical Science USSR, Moscow, USSR). *Khirurgiia (Mosk.)* (10):81-85; 1977.

4029 BOWEL DECOMPRESSION FOR THE TREATMENT OF DYNAMIC INTESTINAL OBSTRUCTION. (Rus.) Shal'kov, J. L.; Nechitailo, P. E.; Grishina, T. A. (Kharkov Scientific Res. Inst. General and Emergency Surgery, Kharkov, USSR). *Vest. Khir.* 118(2):34-38; 1977.

4030 LINEAR PNEUMATOSIS OF THE COLON. (Fre.) Dournovo, P.; Marche, C.; Thibault, P.; Poirson, B.; Corcelle, P. (Hopital Bichat, 170, bd Ney, 75877 Paris Cedex 18, France). *Sem. Hop. Paris* 53(11/12):701-702; 1977.

4031 PRIMARY LINITIS PLASTICA OF THE COLON AND RECTUM. (Eng.) Tootla, F. S.; Stein, H.; Bernacki, E.; Kiechle, F. L. (Professional Building, 909 Woodward Ave., Pontiac, MI 48053). *Am. J. Proctol.* 28(5):29-34; 1977.

4032 MUCIN HISTOCHEMISTRY IN THE DETECTION OF EARLY MALIGNANCY IN THE COLONIC EPITHELIUM. (Eng.) Filipe, M. I. (Westminster Medical Sch., Udall St., London, SW1P 2PP, England). *Adv. Exp. Med. Biol.* 89:413-422; 1977.

4033 GLYCOPROTEIN ALTERATION IN HUMAN COLONIC ADENOCARCINOMA. (Eng.) Kim, Y. S. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Adv. Exp. Med. Biol.* 89:443-468; 1977.

4034 ISCHAEMIC COLITIS AND DRUG ABUSE. (Eng.) Turnbull, A. R.; Isaacson, P. (Southampton Univ. Hosp., Southampton, England). *Br. Med. J.* 2(6093):1000; 1977.

4035 COLONIC DIVERTICULOSIS IN A CHILD. (Eng.) Rees, B. I.; Griffin, P. J. A. (Univ. Hosp. Wales, Cardiff, Wales). *Br. Med. J.* 2(6096):1194; 1977.

4036 NEONATAL INTUSSUSCEPTION: REPORT OF 12 CASES. (Eng.) Patriquin, H. B.; Afshani, E.; Effman, E.; Griscom, N. T.; Johnson, F.; Kramer, S. S.; *et al.* (Centre Hospitalier Universitaire de Sherbrooke, Sherbrooke, Quebec, Canada). *Radiology* 125(2):463-466; 1977.

4037 MALPOSITION OF THE COLON IN RIGHT RENAL AGENESIS, ECTOPIA, AND ANTERIOR NEPHRECTOMY. (Eng.) Curtis, J. A.; Sadhu, V.; Steiner, R. M. (Thomas Jefferson Univ. Hosp., Philadelphia, PA 19107). *Am. J. Roentgenol.* 129(5):845-850; 1977.

4038 NEURONAL COLONIC DYSPLASIA: AN UNUSUAL ASSOCIATION OF HIRSCHSPRUNG'S DISEASE. (Eng.) Puri, P.; Lake, B. D.; Nixon, H. H.; Mishalany, H.; Claireaux, A. E. (Hosp. Sick Children, Great Ormond St., London WC1N 3JH, England). *J. Pediatr. Surg.* 12(5):681-685; 1977.

4039 ENDOSCOPIC APPEARANCE OF AUTO-AMPUTATED POLYPS IN JUVENILE POLYPOSIS COLI. (Eng.) Nelson, E. W., Jr.; Rodgers, B. M.; Zawatzky, L. (J. Hillis Miller Health Center, Box J-214, Gainesville, FL 32610). *J. Pediatr. Surg.* 12(5):773-776; 1977.

4040 THE IDENTIFICATION OF INDIVIDUALS AT HIGH RISK FOR LARGE BOWEL CANCER: AN OVERVIEW. (Eng.) Lipkin, M. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *Cancer* 40(5, Suppl.):2523-2530; 1977.

4041 SURGICAL AND MEDICAL MEASURES IN PREVENTION OF LARGE BOWEL CANCER. (Eng.) DeCosse,

J. J.; Condon, R. E.; Adams, M. B. (8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Cancer* 40(5, Suppl.):2549-2552; 1977.

4042 COLON CANCER PREVENTION: TODAY'S CHALLENGE TO BIOMEDICAL SCIENTISTS AND CLINICAL INVESTIGATORS. (Eng.) Wynder, E. L.; Reddy, B. S. (Naylor Dana Inst. Disease Prevention, American Health Foundation, Valhalla, NY 10595). *Cancer* 40(5, Suppl.):2565-2571; 1977.

4043 THE ROLE OF EARLY DIAGNOSIS IN CONTROLLING LARGE BOWEL CANCER: AN OVERVIEW. (Eng.) Sherlock, P.; Winawer, S. J. (Memorial Sloan-Kettering Cancer Center, 1275 York Ave., New York, NY 10021). *Cancer* 40(5, Suppl.):2609-2615; 1977.

4044 HIRSCHSPRUNG'S DISEASE AND CONGENITAL DEAFNESS: FAMILIAL ASSOCIATION. (Eng.) Weinberg, A. G.; Currarino, G.; Besserman, A. M. (1935 Amelia, Dallas, TX 75235). *Hum. Genet.* 38(2): 157-161; 1977.

4045 TOTAL INTESTINAL AGANGLIONOSIS: AN AUTOSOMAL RECESSIVE CONDITION? (Eng.) MacKinnon, A. E.; Cohen, S. J. (Booth Hall Children's Hosp., Charleston Rd., Blackley, Manchester M9 2AA, England). *Arch. Dis. Child.* 52(11):898-899; 1977.

4046 COLON CANCER: ETIOLOGICAL ISSUES AND PROSPECTS FOR EARLY DETECTION. (Eng.) Jaco, D. (Dept. Family and Community Medicine, Univ. Missouri--Columbia, Columbia, MO 65201). *Prev. Med.* 6(4):535-544; 1977.

4047 RECURRENT APPENDICITIS FOLLOWING APPENDECTOMY. (Eng.) Wilder, J. R.; Schweitzer, D. L.; Aguam, A. S. (Hosp. Joint Diseases, New York, NY). *Abdom. Surg.* 19(6): 147-150; 1977.

4048 BENIGN LYMPHOID HYPERPLASIA OF THE COLON. (Eng.) Liebman, W. M.; Rosental, E. (Dept. Pediatrics, Univ. California, San Francisco, San Francisco, CA 94143). *West. J. Med.* 127(5): 416-418; 1977.

4049 PROLONGED ERYTHROCYTE T-POLYAGGLUTINATION IN TWO CHILDREN WITH BOWEL DISORDERS. (Eng.) Obeid, D.; Bird, G. W. G.; Wingham, J. (West Midlands Regional Blood Transfusion Service, Vincent Drive, Edgbaston, Birmingham B15 2SG, England). *J. Clin. Pathol.* 30(10):953-955; 1977.

4050 Streptococcus milleri IN THE APPENDIX. (Eng.) Poole, P. M.; Wilson, G. (Chester City Hosp., Chester CH2 3EG, England). *J. Clin. Pathol.* 30(10):937-942; 1977.

4051 ADENOSINE 3',5' CYCLIC MONOPHOSPHATE LEVELS IN COLONIC POLYPS AND RECTAL CARCINOMA IN MAN. (Eng.) Britton, D. C.; Cornell, C.; Latner, A. L.; Tregoning, D.; Turner, G. A. (Royal Victoria Infirmary, Newcastle upon Tyne, England). *IRCS Med. Sci. Cancer* 5(10):495; 1977.

See also, 3472, 3775, 3785, 3793, 3796, 3817, 3832, 3863, 3872, 3882, 3888, 3893, 3994, 4053, 4055, 4180, 4205, 4236, 4239, 4240, 4243, 4248, 4260, 4264, 4265, 4274, 4278, 4279, 4281.

LARGE INTESTINE

Ulcerative Colitis

4052 INFLUENCE OF AN ELEMENTAL DIET ON PROTEIN EXUDATION IN CHRONIC INFLAMMATORY BOWEL DISEASE. (Eng.) Axelsson, C. K.; Jarnum, S. (Rigshospitalet, 2100 Copenhagen O, Denmark). *Digestion* 16(1/2):77-86; 1977.

Using ^{131}I-albumin, intestinal protein loss was investigated as a possible indicator of the therapeutic effect of an elemental diet in the treatment of 13 patients with chronic inflammatory bowel disease (9 with ulcerative colitis and 4 with Crohn's disease). Prior prednisone treatment was given in eight cases; in five patients who failed to respond or who responded unsatisfactorily to dietary treatment, prednisone treatment was started or increased after 9-13 days of the dietary treatment. ^{131}I-albumin studies showed no significant change of albumin degradation and, by inference, of intestinal protein loss in the group as a whole. Nevertheless, clinical remission occurred in five patients. A markedly elevated initial albumin breakdown (>16%/day) was associated with poor outlook for the success of treatment. It is concluded that measurement of intestinal protein leakage is of no predictive value as regards the effect of treatment of chronic inflammatory bowel disease with elemental diet. Apparently, diminishing protein exudation is a late phenomenon during a course of clinical remission.

4053 IMMUNOLOGICAL STUDIES IN ULCERATIVE COLITIS. VIII. ANTIBODIES TO COLON ANTIGEN IN PATIENTS WITH ULCERATIVE COLITIS, CROHN'S DISEASE, AND OTHER DISEASES. (Eng.) Carlsson, H. E.; Lagercrantz, R.; Perlmann, P. (Dept. Immunology, Wenner-Gren Inst., Univ. Stockholm, S-106 91 Stockholm, Sweden). *Scand. J. Gastroenterol.* 12(6):707-714; 1977.

The sera of 516 patients with ulcerative colitis, 148 with Crohn's disease, 77 with gastroenteritis, 97 with irritable colon, 12 with salmonellosis, 13 with liver cirrhosis, 16 with urinary tract infection, 158 with other nongastrointestinal diseases, and 158 healthy controls were examined for antibodies to colon antigen. In addition, the reactivity with Common Antigen (CA) of sera from the patients with Crohn's disease, 122 patients with polyposis coli, and 60 relatives of polyposis coli patients was examined. Sera from patients with ulcerative colitis or Crohn's disease had elevated titers to colon antigen from germ-free rats significantly more often ($p<0.05$) than did sera from patients with gastroenteritis, irritable colon, nongastrointestinal diseases, and healthy controls. Elevated anticolon titers in significant frequency were also found in patients with liver cirrhosis, urinary tract infections, and in polyposis coli and their relatives. Women with ulcerative colitis had, on an average, higher titers than men, especially those 30 yr old and over. In Crohn's disease, the antibody titers often increased with time, which was not the case in ulcerative colitis and nongastrointestinal diseases. In conjunction with the results of previous studies, the present study supports the assumption that the antibodies in ulcerative colitis patients react with antigenic determinants distinct from those recognized by the colon antibodies present in other groups, including patients with Crohn's disease and polyposis coli.

4054 EVIDENCE FOR CIRCULATING IMMUNE COMPLEXES IN ULCERATIVE COLITIS [Abstract]. (Eng.) Einstein, E. (Rhode Island Hosp., Providence, RI). *Gastroenterology* 72(5, Part 2):1187; 1977.

4055 ISOLATION AND CHARACTERIZATION OF COLONIC TISSUE BOUND ANTIBODIES FROM PATIENTS WITH ULCERATIVE COLITIS [Abstract]. (Eng.) Das, K.; Dubin, R. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 72(5, Part 2):1043; 1977.

4056 IMPAIRED LYMPHOCYTE FUNCTION IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE (IBD) [Abstract]. (Eng.) Davis, P.; Lyanga, J.; Thomson, A. B. R. (Univ. Alberta, Edmonton, Alberta, Canada). *Gastroenterology* 72(5, Part 2):1044; 1977.

4057 SELECTIVE LYSOSOMAL ENZYME RELEASE FROM MACROPHAGES (MO) STIMULATED BY BACTERIAL LIPOPOLYSACCHARIDES (LPS)--A MECHANISM FOR THE PATHOGENESIS OF INFLAMMATORY BOWEL DISEASE (IBD) [Abstract]. (Eng.) Doe, W. F.; Yang, D.; Henson, P. M. (Scripps Clinic, La Jolla, CA). *Gastroenterology* 72(5, Part 2):1157; 1977.

4058 SERUM-BILE ACIDS IN INFLAMMATORY BOWEL DISEASE [Letter to Editor]. (Eng.) Mihas, A. A.; Gibson, R. G.; Levy, N.; Hirschowitz, B. I. (Div. Gastroenterology, Univ. Alabama, Birmingham, AL 35294). *Lancet* 2(8034):405-406; 1977.

See also, 3530, 4021, 4278.

PANCREAS

4059 DIAGNOSIS OF PANCREATIC CANCER BY ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY AND PANCREOZYMIN SECRETIN TEST. (Eng.) Nakano, S.; Takeda, I.; Watashiki, H.; Nakamura, M. (Ogaki Municipal Hosp., 4-86 Minaminokawa-machi, Ogaki City, 503 Japan). *Gastroenterol. Jpn.* 12(4):263-268; 1977.

The cases of 80 patients with pancreatic cancer are reviewed to evaluate the significance and limitations of endoscopic retrograde cholangiopancreatography (ERCP) and the pancreozymin-secretin (PS) test for the precise and detailed diagnosis of the carcinoma of the pancreas. The patients were divided into 10 groups according to the location and size of the tumor. Changes of the common bile duct (CBD), the main pancreatic duct (MPD), and the accessory pancreatic duct (APD) and duodenal loop obtained by percutaneous transhepatic cholangiography (PTC), drip infusion cholangiography (DIC), hypotonic duodenography (HDG), and ERCP were employed for this classification. In cases of pancreatic head cancer in which the tumor is located near the CBD and apart from the MPD, the pancreatogram remained intact or showed slight narrowing with almost normal pancreatic function. The CBD was obstructed either completely or incompletely. Remarkable impairments in the exocrine pancreas and in bile secretion were observed in cases of tumors involving the MPD, APD, and CBD, accompanied by notable changes in the cholangiopancreatogram. However, varying degrees of impairment in the exocrine pancreas and the bile secretion were observed in cases of pancreatic head cancer apart from the MPD, CBD, and APD, depending upon the degree of invasion toward the MPD; neither ERCP nor the PS test were useful for detecting pancreatic cancer that occurred apart from the MPD. ERCP was also useful in the diagnosis of some cases of cancer of the body and tail of the pancreas. Because the results of the PS test can only demonstrate impairments of pancreatic secretory capacity and the results of ERCP delineate only macroscopic changes of the pancreas, a combination of ERCP and the PS test with conventional examinations is suggested for the correct diagnosis of the pancreatic cancer.

4060 TOTAL PANCREATECTOMY FOR CANCER: AN APPRAISAL OF 65 CASES. (Eng.) Ihse, I.; Lilja, P.; Arnesjo, B.; Bengmark, S. (Dept. Surgery, Univ. Lund, Lund, Sweden). *Ann. Surg.* 186(6):675-680; 1977.

Factors influencing operative mortality and morbidity, long-term survival, and metabolic sequelae were reviewed in 65 patients who underwent total pancreatectomy for cancer. The diagnoses were pancreatic cancer in 58 patients, periampullary cancer in 3, cancer of the bile duct in 2, and leiomyosarcoma of the duodenum and cystadenocarcinoma of the pancreas in 1 patient, resp. In 9 of the 58 cases with cancer of the caput, the histological examination revealed multicentricity of the tumor. In 44%, there were signs of degeneration and fibrosis in the distal part of the gland. Patient mortality in the hospital was 23% for the entire series; after 1970, it was 17%, and among patients operated by senior surgeons especially trained in pancreatic surgery, it was 12% during the whole period. The peroperative bilirubin levels seemed to influence survival time. Among 24 patients operated before 1975 in whom the operating surgeon judged the operation as radical, a 5-yr survival of 21% was recorded. In patients without detectable lymph node metastases, the mean survival time was 25 months. The postoperative exocrine insufficiency and diabetes were possible to control. A blood sugar level above 10 μM was found to significantly decrease the frequency of hypoglycemic attacks. Total pancreatectomy appears to be the surgical procedure preferred when radical treatment is selected.

4061 CARCINOMA OF THE PANCREAS AND PERIAMPULLARY REGION: A 41 YEAR EXPERIENCE. (Eng.) Coutsoftides, T.; Macdonald, J.; Shibata, H. R. (Royal Victoria Hosp., 687 Pine Ave. West, Montreal, Quebec H3A 1A1, Canada). *Ann. Surg.* 186(6):730-733; 1977.

A retrospective review of 329 cases of adenocarcinoma of the pancreas and 31 adenocarcinomas of the ampulla and common bile duct seen between 1929 and 1973 was carried out to determine which treatment procedures are most effective. The most common complaints for carcinoma of the pancreas were pain, weight loss, and jaundice in that order of frequency; jaundice was the most common complaint with periampullary lesions. The most common procedure carried out was a gastric and/or biliary bypass. Thirty-five patients underwent pancreatoduodenectomy. The survival of this latter group was longer and better than those undergoing bypass, and in 40% of patients with ampullary carcinoma a cure was effected. Patients undergoing bypass did not live longer than patients undergoing simple exploratory laparotomy. Duration of symptoms and location of tumor within the pancreas (excluding ampullary tumors) did not significantly alter the prognosis. Pancreatoduodenectomy should be undertaken whenever the tumor is deemed resectable, as this provides the only chance for cure and the best palliation.

4062 THE BIOLOGIC ACTIVITIES OF CYSTIC FIBROSIS SERUM. II. ULTRASTRUCTURAL ASPECTS OF THE EFFECT OF CYSTIC FIBROSIS SERA AND CALCIUM IONOPHORE A23187 ON RABBIT TRACHEAL EXPLANTS. (Eng.) Bogart, B. I.; Conod, E. J.; Gaerlan, P. F.; Conover, J. (New York Univ. Medical Center, New York, NY). *Pediatr. Res.* 12(1):15-24; 1978.

The effects of cystic fibrosis (CF) sera and of calcium ionophore A23187 on rabbit tracheal explants were studied ultrastructurally and cytochemically. The sera and calcium ionophore induced a swelling or an increase in the size and possibly the number of secondary lysosomes and an increase in mucus secretion in epithelium of the rabbit tracheal bioassay system. Extended incubation of the rabbit tracheal explants with either CF or control sera produced a cytotoxic effect on the tracheal epithelium, but only after the termination of the normal bioassay time period. Comparative ultrastructural study of the effect of both CF sera and calcium ionophore A23187 on the rabbit tracheal bioassay system indicated that increased membrane permeability to calcium may be important in the production of the ciliary dyskinesia response by CF serum factor(s) in the rabbit tracheal bioassay system.

4063 UNCOMMON PRESENTATION OF PANCREATIC PSEUDOCYST. (Eng.) Chawla, S. K.; Chawla, K.; Sossi, A. J.; LoPresti, P. A. (Queens Hosp. Center, 82-68 164th St., Jamaica, NY 11432). *Am. J. Gastroenterol.* 68(2):154-160; 1977.

Five cases of pancreatic pseudocyst are presented to illustrate a variety of severe and unusual complications of the disease and to afford an early and accurate analysis of the disease. The complications of pancreatic pseudocyst include infection, spontaneous rupture or fistulization, pancreatic ascites, hemorrhage due to erosion of a major vessel, jaundice due to common bile duct obstruction, hypersplenism, pleural effusion, and mediastinal extension of the cyst through the diaphragmatic hiatus. Diagnostic peritoneal aspiration of hemorrhagic fluid, rich with pancreatic enzymes (amylase, 2,055 Somogyi

U; lipase, 17.4 Cherry-Crandell U) confirms the diagnosis of ruptured pseudocyst. Diagnosis of pancreatic ascites requires a high index of suspicion, especially concerning any patient with an elevated serum amylase level and ascites. Elevated levels of ascitic fluid, amylase, lipase, and protein establish the diagnosis of pancreatic ascites. Obstructive jaundice is nearly always associated with clinical and/or laboratory evidence of either acute or chronic pancreatitis. Pancreatic pseudocyst represents an unresolved pancreatic inflammatory process, and can appear in 1 or 2 weeks following an episode of acute pancreatitis; thus, it should be suspected in a patient who is clinically improving but has persistently elevated levels of serum or urinary amylase. The pancreatic pseudocyst, during the process of expansion, may encroach on neighboring structures and even sometimes, incorporate them in the wall of the cyst. The timing of an elective operation for pseudocyst is best dictated by the clinical course of the patient.

4064 ANGIOGRAPHIC DIAGNOSIS OF ENDOCRINE TUMORS OF THE PANCREAS. (Eng.) Pistolesi, G. F.; Frasson, F.; Fugazzola, C.; Taddei, G.; Caresano, A. (Univ. Hosp., Verona, Italy). *Radiol. Clin. (Basel)* 46(6):401-421; 1977.

4065 CANCER OF THE PANCREAS. (Eng.) Howard, J. M.; Jordon, G. L., Jr. (Medical Coll. Ohio, Toledo, OH). *Curr. Probl. Cancer* 2(3):1-52; 1977.

4066 A TEN-YEAR STUDY OF CARCINOMA OF THE PANCREAS. (Eng.) Atkins, A. R.; Lindell, T. D.; Fletcher, W. S. (Univ. Oregon Health Sciences Center, 3181 S.W. Sam Jackson Park Rd., Portland, OR 97201). *Am. Surg.* 43(10):660-665; 1977.

4067 PLEURAL EFFUSION WITH PANCREATICOPLEURAL FISTULA: A CASE REPORT. (Eng.) Razzaque, M. A.; Hussain, S. A.; Hossain, Z.; Kumar, G. K. (Wayne State Univ. Sch. Medicine, Detroit, MI). *Am. J. Gastroenterol.* 68(1):84-87; 1977.

4068 CARCINOMA OF THE PANCREAS PRESENTING AS RELAPSING PANCREATITIS. (Eng.) Van Waes, L.; Van Maele, V.; Demeulenaere, L.; Lamssens, C. (St. Andriesklíniek, Kromme Walstreet 8, B-8880 Tielt, Belgium). *Am. J. Gastroenterol.* 68(1):88-90; 1977.

4069 FALSE-POSITIVE DIAGNOSES OF PANCREATIC TAIL LESIONS CAUSED BY COLON. (Eng.) Berger, M.; Smith, E. H.; Bartrum, R. J., Jr.; Holm, H. H.; Mascatello, V. (Harvard Medical Sch., 25 Shattuck St., Boston, MA 02115). *J. Clin. Ultrasound* 5(5):343-345; 1977.

4070 TRANSPLANTATION OF THE PANCREAS: ITS PRESENT STATUS AND FUTURE APLLICATION. (Eng.) Gray, B. N. (St. Vincent's Hosp., Fitzroy, Victoria 3065, Australia). *Aust. N.Z. J. Surg.* 47(2):143-149; 1977.

4071 CARCINOMA OF THE PERIAMPULLARY REGION: A REVIEW OF A PERSONAL SERIES OF 87 PATIENTS. (Eng.) Balasegaram, M. (General Hosp., Kuala Lumpur, Malaysia). *Br. J. Surg.* 63(7):532-537; 1976.

See also, 3848, 3849, 3851, 3862, 3867, 3873, 4076, 4080, 4081, 4084, 4085, 4183.

PANCREAS

Pancreatitis

4072 EARLY ASSESSMENT OF SEVERITY OF ACUTE PANCREATITIS USING PERITONEAL LAVAGE. (Eng.) Pickford, I. R.; Blackett, R. L.; McMahon, M. J. (General Infirmary, Leeds LS1 3EX, England). *Br. Med. J.* 2(6099):1377-1379; 1977.

The value of peritoneal lavage in determining the severity of acute pancreatitis was assessed in 27 patients. Peritoneal lavage using 1 liter of isotonic saline was performed as soon as possible after diagnosis of acute pancreatitis. There were no complications. Severe attacks (defined retrospectively according to the progress of the attack) were characterized by the presence of free peritoneal fluid and by dark-colored and often opalescent return fluid. The concentrations of albumin, SGOT, and total protein in the return fluid provided good discrimination ($p<0.001$ for each parameter) between severe and mild attacks, and there were also significant differences in the concentrations of amylase, urea, calcium, potassium, bilirubin, alkaline phosphatase, and the WBC count ($p<0.001$, $p<0.01$, $p<0.01$, $p<0.01$, $p<0.01$, $p<0.05$, and $p<0.02$, resp.). Lavage successfully predicted severe disease in five patients whose condition had been clinically assessed as mild.

4073 THE USE OF A NEW PROTEINASE INHIBITOR IN ACUTE PANCREATITIS. (Ger.) Kronberger, L.; Musil, H. E.; Hollerl, G.; Prexl, H. J.; Eide,

M. (Chirurgische Universitatsklinik, Auenbruggerplatz 1, A-8036 Graz, Austria). *Wien. Med. Wochenschr.* 127(16):517-521; 1977.

The therapeutic effectiveness of Pantinol, a new proteinase inhibitor, was studied in 50 patients with acute pancreatitis. Primary acute pancreatitis was diagnosed in 28 patients and postoperative acute pancreatitis in 22. In addition to the conventional therapy, the patients received i.v. infusions of Pantinol in 5% glucose or levulose solution. The daily dose (administered in 2-4 portions) was 400,000-1,500,000 U in patients with acute primary pancreatitis, and 500,000-1,000,000 U in those with postoperative pancreatitis, depending on the grade of the disease. The therapy resulted in the rapid subsidence of the symptoms and normalization of the elevated urinary amylase and leukocyte levels in all but four patients with acute primary pancreatitis. The amylase levels were consistently normal after the 10th day. Pantinol was well tolerated by the patients. The findings indicate the great value of Pantinol in the treatment of patients with acute pancreatitis.

4074 SERUM PARATHYROID HORMONE IN PANCREATITIS: A PROSPECTIVE STUDY OF 40 PATIENTS. (Fre.) Galmiche, J. P.; Mallet, E.; Colin, R.; Reumont, G.; Geffroy, Y. (Hopital Charles-Nicolle, 1, rue de Germont, F 76038 Rouen Cedex, France). *Gastroenterol. Clin. Biol.* 1(8/9):653-659; 1977.

Serum parathyroid hormone (PTH) levels were determined in 40 randomized patients with pancreatitis. Calcifying pancreatitis was diagnosed in 20 patients and noncalcifying pancreatitis in the others. Pancreatitis was the first clinical manifestation of primary hyperparathyroidism, which was recognized by a high PTH level in two patients. In the other 38 patients with pancreatitis and without primary hyperparathyroidism, the mean PTH level was not significantly different from that found in the control group (1.28 ng/ml versus 1.18 ng/ml in the controls). The PTH level found in 4 of the 38 patients exceeded the upper limit of the normal range, but primary hyperparathyroidism was ruled out on the basis of other biochemical findings. The pathogenesis of pancreatitis in hyperparathyroidism has not yet been clarified, but hypercalcemia is believed to play an important role, either by activating the pancreatic trypsinogen, or by facilitating the precipitation of calcium in the pancreas.

4075 INHIBITION OF EXAGGERATED GASTROINTESTINAL GLUCAGON RESPONSES IN CHRONIC PANCREATITIS BY SOMATOSTATIN. (Eng.) Botha, J. L.; Vinik, A. I.; Child, P. T.; Jackson, W. P. U. (Dept. Medicine, Univ. Cape Town, Cape Town, South Africa). *J. Clin. Endocrinol. Metab.* 45(6):1265-1270; 1977.

The effects of somatostatin on cross-reacting gastrointestinal glucagon-like immunoreactivity (GLI) and "pancreatic" immunoreactive glucagon (IRG) responses to p.o. glucose were studied in five patients with chronic pancreatitis and five normal controls. Glucose administration caused an exaggerated release of GLI and a slight early rise in IRG concentration in patients with chronic pancreatitis (who have impaired insulin release). The i.v. administration of somatostatin (200 μg), followed by infusion of an additional 200 μg over 2.5 hr, abolished the GLI and insulin responses, but did not change glucose tolerance. This result contrasts with the relatively minor effects of somatostatin on GLI responses in controls, where the clear deterioration in glucose tolerance may relate to inhibition of insulin release.

4076 THE FREQUENCY OF MACROAMYLASEMIA AND THE DIAGNOSTIC VALUE OF AMYLASE TO CREATININE CLEARANCE RATIO IN PATIENTS WITH ELEVATED SERUM AMYLASE ACTIVITY. (Eng.) Durr, H. K.; Bindrich, D.; Bode, J. C. (Medizinische Klinik der Universitat, D-3550 Marburg/Lahn, W. Germany). *Scand. J. Gastroenterol.* 12(6):701-705; 1977.

The frequency of macroamylasemia was studied in 190 patients with elevated serum amylase levels. The value of the amylase to creatinine clearance ratio (C_{am}/C_{cr} ratio) as a screening test for macroamylasemia was assessed in 183 patients. Macroamylasemia was found in three patients. In these patients, macroamylasemia persisted after the total activity of serum amylase had fallen to nearly normal levels. The C_{am}/C_{cr} ratios were determined 14 times in the three macroamylasemic patients. Only one of the 14 values was clearly less than 1%. C_{am}/C_{cr} ratios above 4% were found in 83 patients. In 56 of them, the diagnosis of acute pancreatitis could not be confirmed. Nineteen of 46 patients with acute pancreatitis had C_{am}/C_{cr} ratios below 4%. C_{am}/C_{cr} ratios below 1% were also found in 48 of 134 patients without macroamylasemia. It is concluded that high and low C_{am}/C_{cr} ratios are not specific for acute pancreatitis and macroamylasemia, resp., and that a normal C_{am}/C_{cr} ratio excludes neither acute pancreatitis nor macroamylasemia.

4077 CALCITONIN IN THE TREATMENT OF ACUTE PANCREATITIS. A MULTI-CENTRE DOUBLE BLIND STUDY [Abstract]. (Eng.) Goebell, H.; Ammann, R.; Akovbiantz, A.; Barth, E.; Hahnloser, P.; Herfarth, C.; *et al.* (Pancreatitis Study Group, Essen, W. Germany). *Ir. J. Med. Sci.* 146(Suppl. 1):36; 1977.

4078 A SINGLE CENTRE DOUBLE BLIND TRIAL OF TRASYLOL THERAPY IN PRIMARY ACUTE PANCREATITIS [Abstract]. (Eng.) Imrie, C. W.; Benjamin, I. S.; Ferguson, J. C.; Thompson, W. O.; McKay, A. J.; Blumgart, L. H. (Royal Infirmary, Glasgow G4 OSF, Scotland). *Ir. J. Med. Sci.* 146 (Suppl. 1):35; 1977.

4079 MUSCARINE-INDUCED EXPERIMENTAL PANCREATITIS [Abstract]. (Eng.) Murphy, J. J.; McGeeney, D. M.; FitzGerald, O.; McGeeney, K. F.

(Dept. Medicine, Therapeutics, Univ. Coll., Dublin, Ireland). *Ir. J. Med. Sci.* 146(Suppl. 1):32; 1977.

4080 A NEW PANCREATIC FUNCTIONAL EXPLORATION TEST: THE PABA TEST [Abstract]. (Eng.) Ribet, A.; Escourrou, J.; Frexinos, J.; Vaysse, N. (Service des Maladies de l'Appareil Digestif, C.H.U. de Rangueil, 31054 Toulouse Cedex, France). *Ir. J. Med. Sci.* 146(Suppl. 1):31; 1977.

4081 EXOCRINE PANCREATIC INSUFFICIENCY IN RECOVERED ACUTE PANCREATITIS AND IN ACUTE RECURRENT PANCREATITIS (AN OPEN QUESTION) [Abstract]. (Eng.) Farini, R.; Del Favero, G.; Pedrazzoli, S.; Fabris, G.; Adorati, M.; Kind, R.; *et al.* (Istituto Clinica Medica I, Universita Padova, Padova, Italy). *Ir. J. Med. Sci.* 146 (Suppl. 1):88-89; 1977.

4082 SERUM CHOLECYSTOKININ FASTING LEVELS IN CHRONIC RELAPSING PANCREATITIS [Abstract]. (Eng.) Ederle, A.; Vantini, I.; Harvey, R.; Piubello, W.; Oliver, J.; Benini, L.; *et al.* (Clinica Medica III, Policlinico, 37100 Verona, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):30; 1977.

4083 HIGH DOSAGE EFFECTIVE TRASYLOL THERAPY IN EXPERIMENTAL ACUTE PANCREATITIS [Abstract]. (Eng.) Imrie, C. W.; Mackenzie, M. (Royal Infirmary, Glasgow G4 OSF, Scotland). *Ir. J. Med. Sci.* 146 (Suppl. 1):42; 1977.

4084 GREY SCALE ULTRASONOGRAPHY IN ACUTE PANCREATITIS. A PROSPECTIVE STUDY [Abstract]. (Eng.) McKay, A. J.; Duncan, J. G.; Imrie, C. W.; O'Neill, J.; Benjamin, I. S.; Blumgart, L. H. (Royal Infirmary, Glasgow G4 OSF, Scotland). *Ir. J. Med. Sci.* 146(Suppl. 1):76-77; 1977.

4085 FREQUENCY OF EXTRAHEPATIC PORTAL HYPERTENSION (E.P.H.) IN CHRONIC PANCREATITIS (C.P.) AND ITS COMPLICATIONS [Abstract]. (Eng.) Naccarato, R.; Farini, R.; Fabris, G.; Del Favero, G.; Kind, R.; Pedrazzoli, S.; *et al.* (Istituto Clinica Medica I, Universita Padova, Padova, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):41-42; 1977.

See also, 3850, 3862, 3867, 4068.

LIVER AND BILIARY TRACT

4086 SALIVARY ANTIPYRINE KINETICS IN HEPATIC AND RENAL DISEASE AND IN PATIENTS ON ANTICONVULSANT THERAPY. (Eng.) Harman, A. W.; Penhall, R. K.; Priestly, B. G.; Frewin, D. B.; Phillips, P. J.; Clarkson, A. R. (Dept. Human Physiology and Pharmacology, Univ. Adelaide, Adelaide, South Australia 5000, Australia). *Aust. N.Z. J. Med.* 7(4):385-390; 1977.

The effects of liver disease, renal failure, and hepatic microsomal enzyme induction on the elimination kinetics of antipyrine in saliva were examined in 6 patients with chronic liver disease, 5 patients with chronic renal failure, 9 patients receiving anticonvulsant therapy, and 20 healthy controls. Antipyrine (10 mg/kg) was given p.o. to all subjects and assayed in saliva by gas-liquid chromatography. The mean antipyrine half-life from saliva in the epileptic subjects receiving anticonvulsant therapy (6 ± 0.9 hr) was significantly shorter than in the normal volunteers (10.7 ± 0.6 hr). Therapy included phenytoin and phenobarbitone, two drugs known to induce hepatic microsomal enzymes. The five subjects with chronic renal failure exhibited no significant difference in salivary antipyrine half-life (11.7 ± 1.9 hr) compared to the controls, whereas the subjects with chronic liver disease and impaired hepatic function had significantly increased half-life values (42.4 ± 10 hr). The results suggest that differences in the activity of hepatic microsomal enzymes are reflected by changes in salivary antipyrine elimination kinetics. Chronic renal failure appeared to have no effect on the function of these enzymes.

4087 SERUM IMMUNOREACTIVE PROLYL HYDROXYLASE IN LIVER DISEASE. (Eng.) Tuderman, L.; Risteli, J.; Miettinen, T. A.; Kivirikko, K. (Dept. Medical Biochemistry, Univ. Oulu, Kajaanintie 52 A, SF-90220 Oulu 22, Finland). *Eur. J. Clin. Invest.* 7(6):537-541; 1977.

The concentration of serum immunoreactive prolyl hydroxylase (SIRPH) was measured in 30 patients with chronic active hepatitis, 13 with primary biliary cirrhosis, 4 with alcoholic or idiopathic cirrhosis, and 4 with acute hepatitis, and the values were compared with those in 23 controls. Increases in SIRPH were found in all patients with liver diseases, individual values being highest in primary biliary cirrhosis in which about two-thirds of the patients had values more than 2 standard deviations above the mean value in the controls. No correlation was found between SIRPH and other tests of liver function or some routine laboratory tests. SIRPH may reflect some hitherto unknown or unmeasured process in the diseased hepatic cells.

4088 ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY (ERC) IN NONAMEBIC LIVER ABSCESSES.

(Eng.) Ascione, A.; Elias, E.; Scott, J.; Sherlock, S. (Ospedale Cardarelli-XX Divisione, Sezione Epatologia, Naples, Italy). *Am. J. Dig. Dis.* 23(1): 39-44; 1978.

Two cases of liver abscesses are reported in which the diagnosis was suggested by a combination of liver scanning, ultrasonography, arteriography, and liver biopsy and then confirmed by endoscopic retrograde cholangiography (ERC), which showed intrahepatic extravasation of contrast material from the biliary tree. A 53-yr-old man with a 1-month history of jaundice, colicky periumbilical pain, malaise, lethargy, vomiting, and diarrhea underwent a technetium-99 colloidal liver scan and gallium-67 scan, and ultrasonography, all of which showed an enlarged liver and suggested space-occupying lesions. The liver biopsy showed intensive centrilobular congestion. Benzyl-penicillin was administered in place of cotrimoxazole following demonstration of anaerobic coccus in the liver biopsy. Endoscopic retrograde cholangiopancreatography (ERCP) showed no gallstones and the diagnosis of liver abscesses was confirmed. At laparotomy, pus was drained from one of two cystic cavities in liver lobes, and many firm nodules were found. The patient recovered quickly and was healthy at 1 yr of follow-up. A 13-yr-old male student was seen with fever, malaise, vomiting, and right upper quadrant pain; he had a 17-month history of pyrexia at monthly intervals associated with vomiting and dark urine. He became jaundiced and a laparotomy was performed that showed a markedly enlarged and inflammed liver with multiple adhesions surrounding the gallbladder. No evidence of cholestasis was found in liver biopsy. Liver technetium scan showed no space-occupying lesions. Despite treatment with gentamicin and ampicillin, the patient remained pyrexial with increasing jaundice and anemia. Radiotechnetium scan and celiac arteriography of the liver showed markedly enlarged liver. Gray-scale ultrasound showed no evidence of lesions in the liver. There was no evidence of tumor. ERCP showed a dilated common bile duct and gross distortion of the intrahepatic biliary tree. During treatment with i.v. metronidazole and p.o. cotrimoxazole, the fever subsided. After 3 months, the patient was well, with normal liver function tests, and ERCP showed that the intrahepatic biliary tree was less disorganized. ERCP is a valuable method in the search for an underlying cause in nonamebic liver abscesses due to its ability to delineate clearly the details of the intrahepatic biliary tree.

4089 EPIDEMIOLOGICAL RELATIONSHIP BETWEEN STEROID HORMONES AND LIVER LESIONS.

(Eng.) Mahboubi, E.; Shubik, P. (Univ. Nebraska Medical Center, 42nd and Dewey Ave., Omaha, NB 68105). *J. Toxicol. Environ. Health* 3(1/2)207-218; 1977.

The incidence of benign liver cell adenomas in female users of steriod sex hormones (oral contraceptives) is reviewed to determine the possible relationship between these drugs and the occurrence of benign liver tumors, entities once considered rare. Pathologists do not yet agree on the nomenclature of these lesions and commonly use terms such as adenoma, benign hepatoma, hepatic cell adenoma, focal nodular hyperplasia, mixed adenoma, solitary hyperplastic nodules, and hamartoma. Among 137 cases in the literature in the past 3 yr, 60 were discovered by sudden onset of symptoms, 54 by gradual onset, 15 incidentally, and 8 by unknown means. In the absence of tumor registries for these lesions, the authors used personal contact with surgeons, family physicians, and pathologists (by mail or interview) to discover 20 additional cases of liver lesions in women in Nebraska currently using oral contraceptives. Of the 20 cases, 4 were diagnosed as primary malignant liver tumors (hepatocellular adenomas) and the remainder as benign liver tumors. The four patients with hepatocellular carcinoma died at surgery or within 2-3 days thereafter; one patient with ruptured benign adenoma and one with spontaneous rupture of the liver also died. A sudden, severe onset of epigastric pain, shock, and symptoms of internal bleeding occurred in 35% of the patients, a gradual onset of pain and the presence of a palpable mass occurred in 45%, and in 20% the lesions were discovered incidentally during surgery for other causes. In 16 of the 20 cases, a mestranol combination pill had been taken. The period of pill use ranged from 3-79 months (mean, 42.3 months). These tumors occurred over the last 10 yr with incidence rates of 0.052/100,000 population in 1968 and 0.169 in 1975; however, more data must be assembled before meaningful incidence rates can be calculated. Studies of hepatomas published by the American College of Surgeons and published world wide during the last 3 years are cited that demonstrate similar results. It is suggested that more information be assembled to establish incidence rates of these liver lesions to discover the risk for oral contraceptive users, and to ascertain which hormones act independently or in combination with other factors as etiological agents of these entities

4090 PRIMARY SARCOMA OF THE LIVER: REPORT OF A CASE WITH EXCELLENT RESPONSE TO HEPATIC ARTERY LIGATION AND INFUSION CHEMOTHERAPY.

(Eng.) Tanner, A. R.; Bolton, P. M.; Powell, L. W. (Royal Brisbane Hosp., Herston Rd., Brisbane 4029, Australia). *Gastroenterology* 74(1):121-123; 1978.

A case of primary undifferentiated liver sarcoma, successfully treated with hepatic artery ligation and infusion chemotherapy, in a 66-yr-old woman is reported. The presenting symptoms included a tender enlarged liver, persistent pyrexia, weight loss, vomiting, and diarrhea. Preoperatively, the presentation was considered to be that of an abscess with associated severe constitutional symptoms requiring urgent drainage. Neither hepatic scan nor ultrasound clearly distinguished between abscess or neoplasm. Celiac axis angiography performed before hepatic artery ligation demonstrated a solid vascular lesion consistent with a neoplasm. The patient's response to palliative treatment with hepatic artery ligation and chemotherapy with 5-fluorouracil (750 mg, 3 weeks) via the hepatic artery was excellent. This may be the first report of such a response in a sarcoma localized to the liver. This therapy may well be useful in symptomatic patients in whom partial hepatectomy is not feasible.

4091 IMMUNE COMPLEXES AND ABNORMAL LIVER FUNCTION IN HAEMOPHILIA. (Eng.) McVerry, B. A.; Voke, J.; Mohammed, I.; Dormandy, K. M.; Holborow, E. J. (Royal Free Hosp., London NW3 2QG, England). *J. Clin. Pathol.* 30(12):1142-1146; 1977.

Immunological parameters were evaluated in 55 hemophiliacs, 55% of whom had abnormal liver function tests. Abnormal ^{125}I-complement component 1q (^{125}I-Clq)-binding activity was found in the sera of 94% of the 55 patients. Sera from 66% of these patients inhibited macrophage uptake of labeled aggregated human IgG in a competitive radiobioassay. These results suggest that large molecular weight immune complexes are present in these sera. Analysis of the precipitates obtained directly from the sera by the addition of 4% polyethylene glycol showed either a mixture of IgG and IgM or IgM alone. There was poor correlation between the radiobioassay results and the Clq-binding activities in the whole group of 55 patients, suggesting a heterogeneous population of complexes. Nevertheless, a significant correlation (r=0.75) was found between Clq-binding activities and the radiobioassay results in seven patients with antibodies to factor VIII, suggesting a homogeneous population of complexes. There was poor correlation between the level of immune complexes and the amount of replacement therapy that the patient had received in the previous 6 months and between the abnormal liver function test results and the Clq-binding activities and radiobioassay results. Only two patients had clinical evidence of liver disease.

4092 GIANT HEMANGIOMATOSIS OF THE LIVER IN INFANCY. (Eng.) Othersen, H. B.; Watanatittan, S. (Medical Univ. South Carolina, 80 Barre St., Charleston, SC 29401). *Am. Surg.* 44(1):20-25; 1978.

Two case reports of hepatic hemangiomatosis in infancy are presented to clarify the definition of this entity, to review its therapy by corticosteroid administration and hepatic artery ligation, and to compare a successful outcome with an unsuccessful one. A liver scan on a 2-month-old girl with increasing abdominal girth, anemia, and edema of lower extremities showed a markedly enlarged liver with little functioning tissue. Retrograde aortogram revealed extensive neovasculature throughout the liver suggestive of diffuse hemangiomatosis. Prednisolone therapy (30 mg i.v. followed by 15 mg every other day) day) was unsuccessful. During exploratory laparotomy, diffuse involvement of the liver by large, cavernous vascular spaces was found, and the right hepatic artery was ligated. Prednisolone treatment was continued and irradiation (total dose, 350 rads over 8 days) was given, but the signs of disseminated intravascular coagulopathy developed with a platelet count of 30,000. The patient died 12 hr following a second operation, during which the proper hepatic artery and the right branch of the portal vein were ligated. A 2-month-old girl was seen with rapidly progressing abdominal distention and a firm palpable mass. X-ray films showed a large liver, while retrograde aortogram visualized a vascular lesion involving the entire liver. The proper hepatic artery was ligated; at this time, the liver was diffusely enlarged with cavernous vascular spaces. Over a period of 2 months after surgery, the abdominal girth increased 5 cm, and liver scan indicated increase in the filling defects with revascularization of the hemangioma. Prednisone (15 mg p.o.) was given every other day. Over 5 months, the abdominal girth increased 3 cm, then decreased slightly, and stabilized. Differential diagnosis of hemangiomatosis is discussed. It is suggested that, in cases of diagnosed hemangiomatosis of the liver, prednisone should be administered early in large doses (up to 40 mg daily for a few days if the abdomen enlarges rapidly). If there is no response after about 2 weeks, operative ligation of the proper hepatic artery should be performed. Radiotherapy is not recommended.

4093 ULTRASTRUCTURAL OBSERVATIONS ON KUPFFER CELLS IN INTRAHEPATIC CHOLESTATIC JAUNDICE. (Eng.) Djaldetti, M.; Zahav, L. H.; Gafter, U.; Mandel, E. M. (Hasharon Hosp., Petah-Tiqva, Israel). *Arch. Pathol. Lab. Med.* 102(1):49-51; 1978.

Ultrastructural findings in a liver biopsy specimen from a patient with intrahepatic cholestatic jaundice are reported. Marked dilation of the bile capillaries, disappearance of the microvilli, and thickened ectoplasm were observed. The unusual finding was a great increase in the number of Kupffer cells that contained masses of electron-dense material, most probably bile. A second examination of the liver, performed 1 month later when the liver test results had returned to normal, showed only remnants of the Kupffer cells. The Kupffer cells may play a role in the clearance of the blood from the bile pigments.

4094 UNUSUAL OBLITERATIVE DISEASE OF THE HEPATIC VEINS IN AN INFANT. (Eng.) Burkhardt, A.; Kloppel, G. (Institut fur Pathologie der Universitat Hamburg, Martinistr. 52, UKE, D-2000 Hamburg 20, W. Germany). *Virchows Arch.* [*Pathol. Anat.*] 375(3):225-232; 1977.

The case of a 3-month-old boy with fatal congenital leukemia treated with cytostatic drugs (cytosine-arabinoside, 185 mg; vincristine, 0.8 mg) who developed hepatic fibrosis with obliterative lesions of the small hepatic veins is presented. The vascular changes were characterized by an unusual, hitherto unreported angiomatoid proliferation of the endothelium. The process is compared with the more common subendothelial fibrous type of "veno-occlusive disease." The etiology may involve a secondary reaction of the endothelium to a cytostatic-induced lesion with hepatic fibrosis.

4095 'PSEUDOCIRRHOSIS' IN HEREDITARY HAEMORRHAGIC TELANGIECTASIA. (Eng.) Cooney, T.; Sweeney, E. C.; Coll, R.; Greally, M. (Sch. Pathology, Trinity Coll., Dublin, Ireland). *J. Clin. Pathol.* 30(12):1134-1141; 1977.

The case of a 68-yr-old woman with hereditary hemorrhagic telangiectasia (HHT) who developed telangiectasia-associated hepatic fibrosis is described. The patient died of oat-cell carcinoma of the lung. In addition to the structural alterations that have been described previously in HHT, the liver exhibited focal midlobular hepatocyte necrosis and tumor metastases. The hepatocyte hyperplasia in this patient may have been related to high-dose estrogen therapy for HHT.

4096 THE MYTHOLOGY OF HEPATIC TRAUMA--OR BABEL REVISITED. (Eng.) Walt, A. J. (Wayne State Univ. Sch. Medicine, 540 East Canfield Ave., Detroit, MI 48201). *Am. J. Surg.* 135(1):12-18; 1978.

Selected aspects of hepatic injury are reviewed on the basis of case reports for 1961-1976 of 1,404 patients with liver injuries who underwent surgery to clarify the surgical problems encountered in this entity and to dispel a number of common but erroneous ideas concerning this subject. The causes of liver injuries were gunshots (55.3%), stabbing (34.2%), and blunt instruments (10.5%). Isolated hepatic injuries were rare (e.g., <10% in patients with blunt injury); mortality was proportional to the number of organs injured, and exceeded 50% when four organs were damaged. The chest, extremities, head, vascular structures, intestines, and spleen (in descending order of frequency) were the sites of associated injuries, which were often multiple. Surgical methods for treatment are quite varied and are tabulated. Hemorrhage was the major cause of death (62.5% of deaths), followed by sepsis and/or respiratory failure (15%), and heart injuries (15%). In just more than 50% of patients, bleeding from the liver had stopped spontaneously before laparotomy. Manual compression, precise ligation of small arteries or veins, and suturing are also able to produce hemostasis when appropriately applied. Hemobilia was observed in only one case. If bleeding was persistent, apparently arterial, and not associated with a smashed lobe requiring resection, hepatic artery ligation merits consideration. The long-standing aversion to this procedure is challenged, showing that hepatic failure is rare and that sepsis is not an inevitable outcome following this procedure. Indications for hepatic artery ligation are given, and alternatives discussed. Resectional debridement can achieve excellent results, microcrystalline collagen applied to a raw surface to aid in hemostasis has not been sufficiently evaluated, true lobectomy has fallen into deserved disrepute except in well-selected instances, and the gauze pack has clearly useful applications. The cannulation of retrohepatic inferior vena cava performed in nine patients was unsuccessful, but it is likely that the type of patient selected for this procedure markedly influences the outcome. A prospective, randomized study of the use of the T-tube for drainage of the common and bile ducts indicates that this procedure should be avoided except in selected cases in which the extrahepatic ducts have themselves been injured. The experience collected here indicates the necessity of critical evaluation of all ideas and procedures in any scientific field.

4097 SELECTIVITY IN THE MANAGEMENT OF HEPATIC TRAUMA. (Eng.) Flint, L. M.; Mays, E. T.; Aaron, W. S.; Fulton, R. L.; Polk, H. C., Jr. (Univ. Louisville Sch. Medicine, Health Sciences Center, Louisville, KY). *Trans. South. Surg. Assoc.* 88:121-126; 1977.

A retrospective review of 178 consecutive patients who sustained hepatic injuries confirmed that selective hepatic artery ligation (SHAL) is an efficient means of definitive hemostasis. Hepatic wounds were managed by drainage, suture, resectional debridement, SHAL, and formal lobectomy, or combinations thereof. As the injury grade increased, SHAL was employed more frequently. Hepatic artery interruption was successful in controlling arterial bleeding from the hepatic parenchyma in all patients in whom it was employed. The operative records of 59 patients undergoing SHAL disclosed that in 82% the decision to employ SHAL followed the failure of conventional modalities to control arterial bleeding. The mortality among 59 patients who underwent SHAL was 31% compared to an overall mortality for all other treatment modalities of 22%; this difference was not statistically significant. The incidence of perihepatic sepsis following hepatic artery interruption was also not significantly increased when compared with other modalities. Overall, the most frequent complications after severe hepatic trauma were bleeding from extrahepatic sites and sepsis, which occurred in 12 and 10 patients, resp.

4098 ARTHROPATHY IN WILSON'S DISEASE. (Fre.) Boudin, G.; Pepin, B.; Hubault, A.; Goldstein, B.; Lidy, C. (Hopital Lariboisiere, 2, rue Ambroise-Pare, F 75475 Paris Cedex 10, France). *Ann. Med. Interne (Paris)* 128(11):853-856; 1977.

Wilson's disease with neurological symptoms and arthropathy was diagnosed in a 30-yr-old man in 1956. D-penicillamine treatment (1-1.5 g/day) was begun in 1960 and continued to the present; it produced considerable regression of the neurological signs after several months, disappearance of Kayser-Fleischer rings after 4 yr of treatment, and complete compensation of the liver status. Gradual progression of the articular symptoms necessitated the insertion of a MacKee prosthesis in the knee in 1968. Investigation of a surgical specimen revealed condensation of the bone surfaces of the joint; para-articular calcification at the points of insertion of the capsula, ligaments and sinews; and a hypervascularized, angiomatous synovial membrane. The physiopathology of arthropathy in Wilson's disease is unknown. There seems to be no correlation between the intensity of the neurologic, hepatic, and renal syndromes and the arthropathy.

4099 ANGIOGRAPHIC STUDY OF THE VASCULARIZATION OF PRIMARY MALIGNANT LIVER TUMORS: HISTOLOGICAL CORRELATION. (Spa.) Pinchuk, L.; Zeilicoff, R.; Falcon, O.; Kesner, L.; Buquet, J.; Figueroa, M.; Cimino, C. (No affiliation given.). *Acta Gastroenterol. Latinoam.* 7(1):23-31; 1977.

4100 BENIGN LIVER TUMORS IN CHILDREN. (Fre.) Djaja, M.; Bumbic, S.; Lazovic, M. (Pediatric Surgery Clinic, Univ. Belgrade, Belgrade, Yugoslavia). *Ann. Chir. Infant.* 18(1):53-58; 1977.

4101 CURRENT ASPECTS OF PRIMARY LIVER CANCER IN ADULTS (PART IV): PATHOLOGIC ANATOMY. (Spa.) Herrerias, J. M.; Velasco, A.; Matilla, A.; Garrido, M. (Hospital Clinico Universitario de Sevilla, Seville, Spain). *Rev. Esp. Enferm. Apar. Dig.* 49(6):789-800; 1977.

4102 CURRENT ASPECTS OF PRIMARY LIVER CANCER (PART V): PROGNOSIS AND TREATMENT. (Spa.) Herrerias Gutierrez, J. M.; Jimenez Saenz, M.; Garrido Peralta, M. (Hospital Clinico Universitario de Sevilla, Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(1):99-108; 1977.

4103 PRIMARY LIVER CANCER REVEALED BY SPONTANEOUS HEMOPERITONEUM: REPORT OF THREE CASES. (Fre.) Tissot, E.; Weissbrod, R.; Pasquier, P.; Brun, M.; Baudet, B.; Francillon, J. (Hopital Edouard-Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 73(2):146-148; 1977.

4104 OSMOTIC AND MECHANICAL RESISTANCE OF ERYTHROCYTES IN CHRONIC LIVER DISEASES. (Ger.) Konrad, H.; Brust, B.; Oldenburg, G. (Klinik fur Innere Medizin des Bereichs Medizin der Wilhelm-Pieck Universitat, Ernst-Heydemann-Strasse, DDR-25 Rostock, E. Germany). *Z. Gesamte Inn. Med.* 32(6): 143-147; 1977.

4105 POST-HEPARIN LIPOLYTIC EFFECT IN DIFFUSE LIVER DISEASES. (Spa.) Romero, R.; Masdeu, S.; Frison, J. C.; Ras, M. R.; Rubies-Prat, J.; Bacardi, R. (Ciudad Sanitaria de la Seguridad Social, Universidad Autonoma, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(4):439-444; 1977.

4106 ABNORMAL HEPATIC ARTERY ORIGINATING FROM THE SUPERIOR MESENTERIC ARTERY AND DUODENOPANCREATECTOMY. (Fre.) Pouyet, M.; Treboux, M. (Clinique Claude-Bernard, 69600 Oullins, France). *Lyon Chir.* 73(2):152-155; 1977.

4107 ECHOGRAPHY IN THE ASSESSMENT OF LIVER CHANGES IN CHILDREN WITH VARIOUS DISEASES. (Rus.) Oskolkova, M. K.; Dvoryakovsky, I. V. (Scientific Res. Inst. Pediatrics, USSR Acad. Medical Sciences, Moscow, USSR). *Vopr. Okhr. Materin. Det.* 22(2):12-17; 1977.

4108 LAPAROSCOPY WITH MAGNIFYING OPTIC: A METHOD FOR THE MACROSCOPIC STUDY OF LIVER PHYSIOPATHOLOGY. (Spa.) Aguilar Reina, J. (Ciudad Sanitaria "Virgen del Rocio," Seguridad Social, Sevilla, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50 (1):23-30; 1977.

4109 COMPARISON OF ENDOSCOPIC BIOPSY AND SCINTISCANS IN LIVER DISEASES. (Ger.) Selmair, H.; Georgi, P.; Sinn, H.; Junker, H. (Klinik Wartenberg, D-8059 Wartenberg, W. Germany). *Munch. Med. Wochenschr.* 119(29/30):971-974; 1977.

4110 DIAGNOSTIC VALUE OF ISOENZYMES IN LIVER DISEASES. (Ger.) Graubaum, H. J.; Wagenknecht, C.; Schneider, G.; Schimmelpfennig, W.; Klimmt, G.; Baumgarten, R.; *et al.* (II. Medizinischen Klinik des Bereichs Medizin [Charite] Humboldt-Universitat, Hessische Str. 3/4, DDR-104, Berlin, E. Germany). *Dtsch. Gesundheitsw.* 32(24): 1119-1124; 1977.

4111 PURIFICATION OF THE LIVER WITH HETEROLOGUS LIVER. PHYSIOLOGICAL PRINCIPLES AND PRELIMINARY CLINICAL EXPERIENCE. (Ita.) Motta, G. (Istituto di Patologia Chirurgica dell' Universita di Genova, Genova, Italy). *Minerva Gastroenterol.* 23(1):49; 1977.

4112 PLASMA LIGANDIN: MEASUREMENTS IN PATIENTS WITH LIVER DISEASE AND IN ASYMPTOMATIC HBsAg BLOOD DONORS [Abstract]. (Eng.) Bass, N. M.; Kirsch, R. E.; Miller, D. J.; Niewmeyer, J.; Williams, A.; Titmuss, S.; *et al.* (Univ. Cape Town/MRC Liver Res. Group, Cape Town, South Africa). *Gastroenterology* 73(5):1212; 1977.

4113 PERIPHERAL MACROPHAGE FUNCTION IN PATIENTS WITH CHRONIC LIVER DISEASE [Abstract]. (Eng.) Triger, D. R.; Kingham, J. G. C.; Lloyd, R. S.; Wright, R. (Dept. Medicine, Southampton Univ., Southampton, England). *Digestion* 16(4):365; 1977.

4114 HEMODIALYSIS WITH HIGH PERMEABILITY MEMBRANE IN FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Opolon, P.; Nusinovici, V.; Denis, J.; Darnis, F. (C.H.U. Saint-Antoine, Paris, France). *Digestion* 16(4):363-364; 1977.

4115 PLASMA AMINO ACID PATTERNS IN LIVER DISEASE [Abstract]. (Eng.) Morgan, M. Y.; Milsom, J. P.; Sherlock, S. (Royal Free Hosp., Hampstead, London, England). *Digestion* 16(4):364; 1977.

See also, 3642, 3729, 3804, 3844, 3845, 3846, 3850, 3852, 3853, 3854, 3855, 3856, 3857, 3870, 3871, 3878, 3887, 3894, 3895, 3900, 3903, 3914, 3962, 3997, 4126, 4149, 4160, 4163, 4164, 4165, 4168, 4180, 4181, 4197, 4199, 4267, 4268, 4269, 4270, 4271, 4272, 4273, 4279.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

4116 PHENOBARBITAL IN PROPHYLAXIS OF NEONATAL JAUNDICE: A CONTROL TRIAL OF TWO REGIMENS. (Eng.) Salle, B.; Pasquoer, P.; Desebbe, Cl.; Rouzioux, J. M.; Barouty, B. (Hopital Edouard Herriot, Place d'Arsonval, F-69374 Lyon, France). *Helv. Paediatr. Acta* 32(3):221-226; 1977.

The effect of two different dose schedules of phenobarbital on serum bilirubin in premature and full-term newborn infants was compared to determine the minimal period of drug administration required for the prophylaxis of neonatal jaundice. Single i.m. injections of 10 mg/kg of phenobarbital were given to 155 infants before the 12th hr of life; 111 infants each received an i.m. injection of 10 mg/kg of phenobarbital before the 12th hr of life plus two additional 10 mg/kg p.o. doses on the 2nd and 3rd days of life. Serum bilirubin levels measured between the 2nd and 6th days of life were slightly higher in infants receiving the single i.m. dose of the drug than in infants receiving the three-dose regimen; however, the difference was not statistically significant, except on the 3rd day of life ($p<0.01$). Measurements of the blood phenobarbital level on the 4th day of life showed that the mean blood barbiturate level was significantly lower in infants receiving the single i.m. dose (10.61 ± 5.69 mg/100 ml) than in infants on the multiple-dose regimen (22.51 ± 10.61 mg/100 ml, $p<0.001$). There was no significant relationship between the serum bilirubin peak and the blood barbiturate level on the 4th day. In infants weighing between 1,501 and 2,000 g, for example, the mean serum bilirubin levels on the 4th day of life were 10.02 ± 2.37 mg/100 ml in those who received a single phenobarbital dose and 9.78 ± 4.72 mg/100 ml in those who received three doses of the drug. It is concluded that the single injection has the same effect as the prolonged administration, provided it is given within 12 hr after birth.

4117 OBSTRUCTIVE JAUNDICE DUE TO A CHLORINATED HYDROCARBON IN BREAST MILK. (Eng.) Bagnell, P. C.; Ellenberger, H. A. (Izaak Walton Killam Hosp. Children, P.O. Box 3070, Halifax, Nova Scotia B3J 3G9, Canada). *Can. Med. Assoc. J.* 117(9):1047-1048; 1977.

The case is presented of a 6-week-old breast-fed infant with obstructive jaundice and hepatomegaly due to the presence of the dry-cleaning solvent, tetrachloroethylene, in the mother's milk. When breast feeding was discontinued, rapid clinical and biochemical improvement followed. The child grew normally and had normal liver function during 2 yr of follow-up.

4118 DIAGNOSIS OF FUNCTIONAL GILBERT TYPE HYPERBILIRUBINEMIA IN CHILDREN. (Rus.) Syrieva, T. N.; Spasibko, A. M.; Pisarev, A. G.; Fedotov, V. V. (Dept. Infectious Childhood Diseases, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vopr. Okhr. Materin. Det.* 22(2):17-20; 1977.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

4119 ADVERSE DRUG REACTIONS INVOLVING THE LIVER: PROBABLE MECHANISMS. (Eng.) Schaffner, F.; Popper, H. (No affiliation given). *Mt. Sinai J. Med.* 44(6):813-820; 1977.

Metabolic and immune aspects of probable mechanisms of adverse hepatic drug reactions, conventionally separated into predictable and nonpredictable ones, are discussed. The former are dose-dependent, usually have a short latent period, and can be reproduced in animals. The latter are usually dose-independent, have a prolonged latent period, are only exceptionally produced in animals, are rare in children, and occur in only a few of the persons exposed. Drugs influence the cytoskeletal structure of hepatic cells in many ways altering both internal composition and external cell surfaces, which can affect cellular functions. On the other hand, the exposure of some previously hidden membrane proteins or the alteration of membrane proteins by drugs or their metabolites may induce humoral antibody formation, as well as a cell-mediated immune response. The immunologic reaction initiated by drugs and eventually causing hepatocellular injury may develop rapidly within two weeks after drug exposure (e.g., halothane hepatitis) or be delayed and appear slowly after months of therapy (e.g., chronic hepatitis from isoniazid, oxyphenisatin, methyldopa, or even aspirin). Liver injury can be caused by drugs (e.g., polychlorinated biphenyls) acting on cytochromes in the system of drug metabolizing enzymes. Intermediary drug metabolites can also act as toxic or carcinogenic agents. Each drug or metabolite appears to bind preferentially to certain types of macromolecules and probably at specific sites (e.g., binding to DNA initiates carcinogenesis). Toxic intermediates may injure the vascular endothelium leading to veno-occlusive disease (urethane) or the Budd-Chiari syndrome (oral contraceptives). Some drugs (e.g., chloropromazine) and their metabolites probably interfere directly with bile secretion, causing cholestasis. The multiplicity of drug effects makes prevention of adverse drug reactions in the liver extremely difficult. Thus, newer pharmacological and immunological observations confirm the accepted classification of adverse hepatic reactions as (1) predictable toxicities, (2) nonpredictable hepatic reactions, and (3) nonpredictable cholestatic reactions and reveal that they have definable mechanisms. These three reactions may be combined in variable proportions in individual cases, and one drug may elicit different mechanisms, but one reaction will predominate with each drug at one time point in a case.

4120 APRINDINE-INDUCED LIVER INJURY. (Eng.) Elewaut, A.; Van Durme, J. P.; Goethals, L.; Kauffman, J. M.; Mussche, M.; Elinck, W.; *et al.* (Akademisch Ziekenhuis, De Pintelaan 135, B-9000, Gent, Belgium). *Acta Gastroenterol. Belg.* 40(5/6): 236-243; 1977.

Five cases of hepatotoxicity due to the administration of the antidysrhythmic agent aprindine (100 mg/day) are reported. In all five patients, the adverse reaction appeared after a rather brief latent period (1-6 weeks). There were no other manifestations of hypersensitivity such as fever, rash, arthralgia, or eosinophilia. There were few constitutional symptoms, but in two patients severe cholestatic jaundice appeared within 2-3 weeks after initiation of the drug. After withdrawal of the drug, jaundice persisted for many weeks, but the patients recovered completely. There additional patients presented a moderate form of hepatitis, with concomitant elevations of serum amylase and lipase levels in two of them, suggesting a concomitant toxic pancreatitis. Readministration of aprindine for 3 days to these three patients was soon followed by a marked increase in the levels of serum transaminases, thus confirming the offending role of aprindine. It is suggested that the toxicity of aprindine is probably based on an idiosyncrasy of the patient.

4121 HEPATIC TOXICITY ASSOCIATED WITH GOLD THERAPY. (Eng.) Favreau, M.; Tannenbaum, H.; Lough, J. (Montreal General Hosp., Rm. 602 L.H., 1650 Cedar Ave., Montreal, Quebec H3G 1A4, Canada). *Ann. Intern. Med.* 87(6):717-719; 1977.

The clinical, biochemical, and histologic features of three patients who developed cholestatic jaundice after the initiation of chrysotherapy for rheumatoid arthritis are described. Gold sodium thiomalate had been administered in dosages of 37.5, 60, and 110 mg before the onset of jaundice. Liver function studies indicated a cholestatic jaundice in all subjects. One patient underwent exploratory laparotomy because of progressive jaundice. Liver biopsy was done in two patients. In one patient, significant bile stasis and thrombi were seen in the biliary tree. In another patient, liver biopsy showed ballooning of hepatocytes with minimal cholestasis. All patients recovered spontaneously. Awareness of this rare complication may prevent unnecessary diagnostic and surgical procedures in patients with rheumatoid arthritis who may develop jaundice while receiving chrysotherapy.

4122 HALOPERIDOL-INDUCED LIVER DISEASE. (Eng.) Fuller, C. M.; Yassinger, S.; Donlon, P.; Imperato, T. J.; Ruebner, B. (Univ. California, Davis, Sch. Medicine, Davis, CA). *West. J. Med.* 127(6):515-518; 1977.

The cases of two schizophrenic women in whom liver dysfunction developed during therapy with haloperidol are described. The dosages used were within the range recommended for severely disturbed psychiatric patients (40 mg/day in the first patient, 20-25 mg/day in the second). In the first patient, a generalized hypersensitivity reaction developed; the other patient presented with painless jaundice. Biochemically, both patients showed evidence of mild hepatocellular disease and cholestasis. In neither patient was evidence of extrahepatic biliary obstruction found. Liver biopsy in the first patient showed evidence of a hypersensitivity reaction, with some hepatocellular necrosis, but predominant cholestasis. In the second patient, only cholestasis was seen. Haloperidol is felt to be etiologically related to the liver disease seen in these two patients.

4123 SPECTRUM OF METHYLDOPA LIVER INJURY. (Eng.) Thomas, E.; Rosenthal, W. S.; Zapiach, L.; Micci, D. (New York Medical Coll., 1249 Fifth Ave., New York, NY 10029). *Am. J. Gastroenterol.* 68(2):125-133; 1977.

The occurrence of liver injury in seven patients receiving alpha methyldopa for hypertension is reported. All patients presented with symptoms indistinguishable from viral hepatitis, including jaundice and liver enlargement. Histological changes ranged from those consistent with acute hepatitis to those of chronic active hepatitis and subacute hepatic necrosis. On biopsy, the liver of one patient with subacute hepatic necrosis showed severe centrilobular and midzonal injury with a marked inflammatory response consisting of immunocytes, multinucleated cells, rosette formation, and the edge of an area of collapse. This patient, despite corticosteroid administration and supportive measures, rapidly progressed to hepatic failure and died. The autopsy revealed postnecrotic cirrhosis. The architecture of the liver at autopsy was disrupted by extensive fibrosis with nodule formation. There was also marked ductular regeneration. The parenchyma demonstrated both fine and large droplet fatty infiltration, continued liver cell injury, and some bizarre-looking parenchymal cells. Bile extravasates were visible within the fibrous scar. Inadvertent rechallenge with alpha methyldopa after recovery resulted in a dramatic recurrence of symptoms in one patient, indicating that some type of hypersensitivity phenomenon is involved. This finding is supported by the development of autoimmune phenomena, which were observed in two of the patients.

4124 FULMINANT HEPATITIS IN PATIENTS TREATED WITH ISONIAZID AND RIFAMYCIN. A POSSIBLE CONSEQUENCE OF ISONIAZID HEPATOTOXICITY ENHANCED BY ENZYME INDUCTION [Abstract]. (Fre.) Pessayre, D.; Degott, C.; Nouel, O.; Migeut, J. P.; Rueff, B.; Benhamou, J. P. (INSERM, Hopital Beaujon, Clichy, France). *Gastroenterol. Clin. Biol.* 1(5):489; 1977.

4125 OBTUSE LIVER TRAUMA: OPERATED AND NON-OPERATED PATIENTS WITH HEPATIC INJURY. 16 YEARS EXPERIENCE. (Ger.) Hoffmann, R.; Oesch, I.; Muller, H. P.; Nothiger, F. (Kantonsspital, CH-5001 Aarau, Switzerland). *Helv. Chir. Acta* 44(1/2):93-96; 1977.

See also, 3732, 3736, 3821, 3844, 4277.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

4126 LIVER DYSFUNCTION IN PATIENTS WITH HEMOPHILIA. (Eng.) Hilgartner, M. W.; Giardina, P. (New York Hosp.-Cornell Medical Center, 525 East 68th St., New York, NY 10021). *Scand. J. Haematol.* Suppl. 30:6-10; 1977.

The incidence of post-transfusion hepatitis and liver dysfunction was determined in patients with classical hemophilia who received episodic and/or prophylactic factor VIII concentrate. Of 54 patients, 42.5% had persistent biochemical evidence of liver dysfunction with elevated SGOT and SGPT; 3.8% have persistent hepatitis B surface (HBs) antigenicity and 90% have antibodies to hepatitis B surface antigen (HBsAg). The results were the same for those who were treated episodically and received an average of 153 U of factor VIII weekly as for those treated prophylactically who received an average of 686 U factor VIII weekly. The incidence of clinical and/or subclinical disease is unaffected by the transfusion regimen or the amount of concentrate used. The necessity for close follow-up is emphasized for the determination of chronic liver disease and its further therapy.

4127 VIRAL HEPATITIS: ENZYME ASSAYS AND SEROLOGIC PROCEDURES IN THE STUDY OF AN EPIDEMIC. (Eng.) Rakela, J.; Nugent, E.; Mosley, J. W. (Univ. Southern California Sch. Medicine, 2826 South Hope St., Los Angeles, CA 90007). *Am. J. Epidemiol.* 106(6):493-501; 1977.

An epidemic of viral hepatitis in a residence for multiply handicapped children, recognized very early in its course, was investigated prospectively to permit comparison of enzymatic and serologic tests. Thirty-three residents of the institution and 46 full- and part-time employees were studied by the immune adherence hemagglutination procedure for antibody (anti-HAV) to hepatitis A virus (HAV). Of these, 31 residents and 37 staff members were susceptible at the beginning of the epidemic. Nineteen and six, resp., had anti-HAV seroconversion, indicating HAV infection. Thus, 12 children and 31 staff members of presumed susceptibles did not have serologic evidence of infection. The subclinical/clinical ratio for the children was 1.1:1; for personnel, it was 1:1. Serum alanine aminotransferase (ALT) levels compatible with viral hepatitis occurred in 21 persons who had anti-HAV seroconversion; conversely, there were 10 persons who had ALT abnormality without detectable anti-HAV in late specimens among the total of 68 susceptibles. There was no evidence the latter could be attributed to hepatitis B virus infection; therefore, they may represent the endemic occurrence of non-A, non-B agent(s).

4128 HEPATITIS TYPE B: EPIDEMIOLOGY OF NON-PARENTERAL INFECTION. (Eng.) Pal, S. R.; Clements, C.; Ayyagari, A.; Datta, D. V.; Choudhury, S.; Chhuttani, P. N. (Postgraduate Inst. Medical Education and Res., Chandigarh-160012, India). *Bull. Postgrad. Inst. Med. Education Res. Chandigarh* 11(1):35-42; 1977.

The observation of a monthly variation of the proportion of hepatitis B surface antigen (HBsAg)-positive cases of acute hepatitis in and around Chandigarh, northern India, was investigated by studying the correlation between hepatitis cases and average rainfall, maximum temperature, mosquito density, and the frequency of gastroenteritis. A high proportion of positive cases was noticed in the months of July (13.4%), August (19.5%), and September (18.3%). No significant correlation was found between the proportion of positive cases in the disease month and the mosquito density, rainfall, or temperature at the supposed month of hepatitis B infection. A direct linear relationship was established between the proportion of HBsAg-positive hepatitis cases during the month in which the symptoms occurred and that of gastroenteritis in the supposed month of infection (i.e., assuming a 3-month incubation period).

4129 A LONGITUDINAL STUDY ON THE OCCURRENCE OF AUTOANTIBODIES IN THE COURSE OF ACUTE HEPATITIS B. (Eng.) Niermeijer, P.; Gips, C. H.; Verkerk, S.; Snijder, J. A. M. (Majella Hosp., Bussum, Netherlands). *Acta Hepatogastroenterol.* 24(5): 326-333; 1977.

The incidence, titers, and fluorescence patterns of auto-antibodies were studied in a prospective, longitudinal study of 38 patients with acute hepatitis B (AHB) to correlate the results with clinical and biochemical findings in these patients. Five patients were followed for 6-25 weeks after the maximal SGPT level was observed, while 33 were followed for 4-7 yr. Antibodies to nuclei, bile canaliculi, mitochondria, microsomes, or parietal cells were not detected in any of the 354 serum samples. Smooth muscle antibody (SMA) was present in 117 samples from 23 patients, disappeared (1-14 weeks after first detection) from the sera of the patients that subsequently recovered, remained present for at least 4 yr in the one patient with persistent hepatitis B surface antigenemia, and, when present, was always positive at the time of the SGPT peak. Maximal SMA titers were 1:10 (11 patients), 1:50 (9), 1:200 (2), and 1:400 (1). SMA titers higher than 1:50 began from -2 to +3 weeks and ended from 0 to 5 weeks after the SGPT peak. The sera of 6 patients exhibited fluorescence in smooth muscle cells only; in 17 others, fluorescence was also seen around renal tubules, in glomeruli, in hepatocytes, and in gastric mucosa in varying combinations. The type of fluorescence pattern did not correlate with titer height. There was no correlation between the presence of SMA and age, sex, extrahepatic symptoms, height of peak values for SGPT, bilirubin level, alkaline phosphatase level, or ESR. Patients with SMA $\geq$1:50 had their gammaglobulin peak nearly simultaneously with the SGPT peak ($p=0.02$), and their thymol turbidity (TT) peak was 25 U or higher, whereas 9/10 patients with SMA titer of 1:10 and the 9 patients who were SMA-negative had a TT peak <25 U ($p<0.0001$). Sera from one patient whose SMA was 1:10 produced a coarse granular fluorescence in the proximal renal tubules 1 and 2 weeks after the SGPT peak. This autoantibody assessment adds new features to the clinical and biochemical picture of the "median patient" with AHB.

4130 HEPATITIS B SURFACE ANTIGEN (HBsAg) AND ANTIBODY TO HBsAg: PREVALENCE IN HOMOSEXUAL AND HETEROSEXUAL MEN. (Eng.) Dietzman, D. E.; Harnisch, J. P.; Ray, C. G.; Alexander, E. R.; Holmes, K. K. (Dept. Pediatrics, Univ. Washington, Seattle, WA 93114). *JAMA* 238(24):2625-2626; 1977.

The prevalence of serum hepatitis B surface antigen (HBsAg) and antibody to HBsAg (anti-HBs) was compared in 144 homosexual men, 111 heterosexual men with urethritis, and 111 healthy men not questioned about their sexual behavior. HBsAg and anti-HBs were present in 5.6% and 34%, resp., of the homosexual men. The prevalence rates were only 0.9% and 3.6%, resp., in the heterosexuals with nongonococcal urethritis, and also 0.9% and 3.6% in the healthy men. Thus, previous exposure to hepatitis B virus (HBV) was estimated to be 8.8 times greater for homosexual men than for heterosexual men. All four HBsAg-positive sera from homosexual men were subtyped as "*ad*," whereas subtype "*ay*" is preponderant in i.v. drug abusers. Future public health measures to control HBV infection should address the prevention of sexually transmitted HBV infection among homosexual men.

4131 SEROEPIDEMIOLOGICAL INVESTIGATION OF PATIENTS AND FAMILY CONTACTS IN AN EPIDEMIC OF HEPATITIS A. (Eng.) Frosner, G. G.; Overby, L. R.; Flehmig, B.; Gerth, H. J.; Haas, H.; Decker, R. H.; *et al.* (Max v. Pettenkofer-Institut fur Hygiene und Medizinische Mikrobiologie, Pettenkoferstr. 9a, 8000 Munchen 2, W. Germany). *J. Med. Virol.* 1(3): 163-173; 1977.

Serial blood and fecal samples were collected from a total of 53 patients and family contacts during an outbreak of hepatitis A in a village of 6,361 inhabitants. The samples were tested by a solid-phase competitive type radioimmunoassay for hepatitis A antigen and hepatitis A antibody. The amount and duration of excretion of hepatitis A antigen was correlated with the severity of the illness. In two severe clinical cases, hepatitis A antigen was demonstrated in fecal extracts 11 days before the onset of jaundice and continuing for 10 days thereafter, with maximum shedding during the late incubation period. Fecal antigen was demonstrated in low concentrations for only 2 days in a patient with mild disease and in a person with subclinical infection. There was an inverse correlation between the incidence of infection and prevalence of hepatitis A antibody and age. Of 24 infections, 19 occurred in persons in the age group 0 to 20 yr, a group in which only 6% of individuals had pre-existing antibody. Hepatitis A antibody was present in the serum of three persons in low titers of 1:20 to 1:40 on the day jaundice developed. The antibody titers increased very rapidly during the following 2 weeks of illness and slowly during the following months, reaching titers of 1:900 to 1:3,500. In a separate study, a mean antibody titer of 1:591 was found in 13 patients, 12 yr after clinical hepatitis A with jaundice.

4132 DETECTION OF HEPATITIS A ANTIGEN BY IMMUNOFLUORESCENCE. (Eng.) Mathiesen, L. R.; Feinstone, S. M.; Purcell, R. H.; Wagner, J. A. (Natl. Inst. Allergy and Infectious Diseases, Bethesda, MD 20014). *Infect. Immun.* 18(2):524-530; 1977.

Hepatitis A antigen (HAAg) was demonstrated by immunofluorescence (IF) in liver biopsies from chimpanzees with experimental hepatitis A virus infection. Blocking experiments with paired sera from patients with hepatitis types A, B, or non-A, non-B, as well as with purified HAAg, showed that the fluorescence was specific for HAAg. HAAg was demonstrated only in biopsies from chimpanzees inoculated with hepatitis A virus. In two of four chimpanzees biopsied weekly (from before experimental inoculation through convalescence), HAAg was detected by IF before stool shedding of HAAg, elevation in SGPT, or histopathological evidence of liver disease was seen. The HAAg was detected for 4-5 weeks; the last IF-positive biopsy was obtained after SGPT activity had returned to normal. In the two other chimpanzees, HAAg was detected only in the biopsy taken at the time of SGPT elevation. In the early IF-positive biopsies, HAAg was diffusely distributed in the cytoplasm of many cells, but it later accumulated in a focal distribution in the cytoplasm of a few of the hepatocytes and Kupffer cells. This cytoplasmic distribution agrees with previous electron microscopic data.

4133 HEPATITIS A-VIRUS PARTICLES IN STOOLS OF PATIENTS FROM A NATURAL HEPATITIS OUTBREAK IN GERMANY. (Eng.) Flehmig, B.; Frank, H.; Frosner, G. G.; Gerth, H. J. (Hygiene-Institut, Universitat Tubingen, 7400 Tubingen, W. Germany). *Med. Microbiol. Immunol.* 163(3):209-214; 1977.

During a hepatitis outbreak in Southern Germany, 27-nm particles were visualized by immune electron microscopy in the stools of two patients. These particles were serologically similar to hepatitis A virus particles identified in the United States. The buoyant density of these particles was 1.34 g/cm^3 as determined by cesium chloride density centrifugation. The particles were first observed in small numbers in a stool obtained 11 days, and in large numbers in stools obtained 6 and 7 days before the onset of jaundice. Few particles were seen on the day of the onset of jaundice and none thereafter. In both patients, a sereoconversion to hepatitis A virus was demonstrated by immune electron microscopy.

4134 OCCURRENCE OF e ANTIGEN IN ACUTE HEPATITIS B. (Eng.) Gibson, P. E.; Ruparelia, K. (Central Public Health Lab., Colindale Ave., London NW9 5HT, England). *J. Clin. Pathol.* 30(10):925-927; 1977.

The occurrence of e antigen in 44 patients with acute hepatitis B was studied to determine if e was related to the outcome of the illness. In 13.6% of cases, e was detected, and in none of these did the carrier state develop. The hepatitis B surface antigen carrier state developed in 4.6% of the patients and in none of these was e antigen detected. Anti-e was detected in only three cases. Only in the very early acute phase of illness e was detected, and the time that serum samples were taken for the detection of e was considered to be very significant. The occurrence of e was not found to affect the duration of HBs antigenemia in those patients who recovered completely. There was no evidence to indicate that the presence of e indicates an increased risk of chronic liver disease.

4135 RUBELLA ANTIBODIES AND ACUTE VIRAL HEPATITIS. (Eng.) Sloth, K.; Vaheri, A.; Laitinen, O.; Faber, V.; *et al.* (Statens Seruminstitut, Amager Blvd. 80, DK-2300 Copenhagen S, Denmark). *Scand J. Infect. Dis.* 9(3):161-165; 1977.

The frequency of the association between high antibody titers against rubella and measles viruses and acute hepatitis was evaluated in 97 hepatitis patients and in 97 age- and sex-matched controls. Hemagglutination inhibition (HI) and complement fixation (CF) antibodies to rubella, measles, and influenza A viruses were determined in all subjects. In patients, particularly in those over 30 yr of age, a small but statistically significant increase in rubella HI titers was seen. In three hepatitis cases, the rubella HI titers were very high (≥2,560). The antibody levels against measles and influenza A viruses did not differ from those in the controls. The data indicate that a small proportion of acute hepatitis patients show a transient strong humoral immune response to rubella virus.

4136 INDIVIDUAL FREE FATTY ACIDS IN PATIENTS WITH LIVER DISEASE. (Eng.) Gunnlaugsson, O.; Berkowitz, D. (St. Joseph's Hosp., Reykjavik, Iceland). *Am. J. Dig. Dis.* 22(11):1005-1009; 1977.

The total free fatty acids, blood glucose, and individual free fatty acids were studied in 8 patients with viral hepatitis and 13 with cirrhosis. The results were compared with those obtained in nine normal controls. Free fatty acids were significantly elevated ($p<0.05$) in the patients with liver disease as compared with normal controls. A fall in free fatty acids following the ingestion of amino acids and dextrose was noted in normal subjects as well as liver patients. The glucose tolerance test was abnormal in five of seven patients with hepatitis and in four of six with cirrhosis but in none of the controls. Highly significant ($p<0.01$) differences were found in the composition of individual free fatty acids in patients with liver disease as compared with normal subjects; arachidonic and linoleic acids were decreased, while monounsaturated and saturated fatty acids were increased in patients with viral hepatitis and cirrhosis. No significant changes were noted in the percentage composition of individual free fatty acids following the ingestion of amino acids and dextrose.

4137 VIRAL HEPATITIS. (Eng.) Naidoo, G.; Van Aswegen, G.; Keeton, G. R. (Somerset Hosp., Green Point, Cape Town 8051, South Africa). *S. Afr. Med. J.* 51(4):99-100; 1977.

4138 AN INVESTIGATION OF AN INTIMATE EPIDEMIC OF VIRAL HEPATITIS [Abstract]. (Eng.) Conn, H. O.; Hoofnagle, J. H. (Veterans Admin. Hosp., West Haven, CT). *Gastroenterology* 72(5, Part 2):1177; 1977.

4139 ACUTE HEPATITIS IN MAN: INCREASED ACTIVITY OF LYSOSOMAL CHOLESTEROL ESTER HYDROLASE [Abstract]. (Eng.) Simon, J. B.; Poon, R. W. M. (Dept. Medicine, Queen's Univ., Kingston, Ontario, Canada). *Clin. Res.* 25(5):689A; 1977.

4140 CLINICAL AND EXPERIMENTAL STUDIES ON ENDOTOXEMIA AND DISSEMINATED INTRAVASCULAR COAGULATION IN FULMINANT HEPATITIS [Abstract]. (Eng.) Yoshimura, R.; Fujiyama, S. (Osaka City Univ. Sch. Medicine, Osaka, Japan). *Gastroenterol. Jpn.* 12(4):326-327; 1977.

4141 EFFECT OF HEPARIN ON FULMINANT HEPATITIS [Abstract]. (Eng.) Maeyama, T.; Tanikawa, K. (Kurume Univ. Medical Sch., Japan). *Gastroenterol. Jpn.* 12(4):327; 1977.

4142 TREATMENT OF FULMINANT HEPATITIS WITH HEMOPERFUSION [Abstract]. (Eng.) Ota, K.; Obata, H. (Tokyo Women's Medical Coll., Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):327; 1977.

See also, 3696, 4087, 4109, 4110, 4115, 4197.

LIVER AND BILIARY TRACT

Chronic Hepatitis

4143 ACTIVE CHRONIC HEPATITIS: PART 2. (Eng.) Fulton, T.; McCann, V. J. (Royal Perth Hosp., Perth, Western Australia, Australia). *Ulster Med. J.* 45(2):195-204; 1976.

To test the effectiveness of corticosteroid therapy in hepatitis B surface antigen (HBsAG)-negative chronic active hepatitis, 40 patients were treated and observed for 4 months to 13 yr. An initial daily dose of 40-45 mg prednisolone (range, 20-90 mg), gradually reduced to a maintenance dose of 2.5-20 mg/day, was given to 15 patients. Twenty-two patients were given corticotropin (40 U/day, i.m.), which was slowly reduced to an average maintenance dose of 30 U twice weekly. Three patients were given betamethasone. A complete remission was experienced by 17 patients in an average time of 19 months. Nine patients maintained slightly elevated ESR, γ-globulin, transaminase, and alkaline phosphatase levels. Six patients showed good clinical response with only marginal improvement of abnormal liver tests. The remaining eight patients were considered "treatment failures." Twenty-five patients experienced complications of treatment. In seven patients, the complications were considered to be serious; three patients on corticotropin experienced transient hyperglycemia, and two patients had worsening of pre-existing diabetes. One patient on prednisolone experienced persistent hyperglycemia, and one experienced transient hyperglycemia. During the follow-up period, ranging from 4 months to 13 years, 26 patients underwent 58 relapses, 44 of which were hepatic in type. Six of the relapses were characteristic of systemic lupus erythematosus episodes. Twelve of the 40 patients have died. Corticotropin and corticosteroid treatment appear to produce a marked symptomatic improvement with a positive clinical and biochemical picture when the treatment is life-long. The side-effects, more numerous with corticosteroids, are out-weighed by the possibility of developing cirrhosis.

4144 EVIDENCE FOR PHASIC SEQUENCES IN NUCLEAR HBcAg FORMATION AND CELL MEMBRANE-DIRECTED FLOW OF CORE PARTICLES IN CHRONIC HEPATITIS B. (Eng.) Gudat, F.; Bianchi, L. (Dept. Pathology, Univ. Basel, CH-4056 Basel, Switzerland). *Gastroenterology* 73(5):1194-1197; 1977.

Liver biopsy specimens from six patients with chronic aggressive hepatitis B and from one kidney transplant recipient with chronic persistent hepatitis B were examined to study distribution patterns of hepatitis B core antigen (HBcAg). Differential distribution patterns of HBcAg (with gradual transitions) were seen: pure nuclear, mixed nuclear/cytoplasmic, and pure cytoplasmic (diffuse and/or submembraneous). This distribution was combined with spotty expression of hepatitis B surface antigen (HBsAg) in the cytoplasm and liver cell membrane and with Dane particles (DP) in blood. A phasic nuclear formation and release of cores from the nucleus and of DP from the cell, resp., is suggested. Electron microscopy of one biopsy indicates a secretory disturbance as a possible cause for HBcAg accumulation in liver cells, the tolerance of which is attributed to immunosuppression therapeutically induced in four patients and suspected in three (2 dialysis patients, 1 with spontaneous chronic aggressive hepatitis B).

4145 CHRONIC HEPATITIS IN HEMOPHILIA. (Eng.) Hasiba, U.; Spero, J. A.; Lewis, J. H. (Central Blood Bank Pittsburgh, 812 Fifth Ave., Pittsburgh, PA 15219). *Scand. J. Haematol.* (Suppl. 30):27-32; 1977.

The relationship of chronic hepatitis B and/or liver dysfunction to treatment in 113 hemophiliacs was evaluated by determining SGOT and SGPT, and by the presence of circulating hepatitis B surface antigen (HBsAg) or antibody (anti-Hbs). The hemophiliacs were divided into three groups according to treatment pattern. Individuals who had received multiple doses of plasma fractions, derived from four or more commercial lots were placed in group I; group II had been treated with fractions from three or fewer lots; and group III had never received commercial fractions, but had been treated with cryoprecipitate. Abnormal liver function tests (LFTs) were found in 87% of group I and 76% of group II, but in only 16% of group III. Differences in LFTs were minor between treated factor VIII- and IX-deficient patients. All patients treated with 100,000 U or more showed either persistent or intermittent abnormalities. In group I, the history of past, overt hepatitis had no influence on observed LFTs. The sera of all patients in the high exposure and all but one in the low exposure groups were positive for HBsAg or anti-Hbs by radioimmunoassay. Splenomegaly was found in 13% of fraction-treated patients. It is concluded that there is biochemical evidence of liver disease following large exposure to commercial factor VIII or IX fractions, which should temper the physician's decision to start treatment with these fractions. On the other hand, evidence that their continued use produces mounting liver dysfunction is insufficient to withdraw this very effective and life-changing treatment from these individuals.

4146 RAPID PROGRESSION OF CHRONIC ACTIVE TYPE B HEPATITIS IN A PATIENT WITH HYPOGAMMAGLOBULINEMIA. (Eng.) Tong, M. J.; Nies, K. M.; Redeker, M. D. (Los Amigos Hosp., Building 1100, Room 53, 7601 E. Imperial Highway, Downey, CA 90242). *Gastroenterology* 73(6):1418-1421; 1977.

The case of a 19-yr-old man with hypogammaglobulinemia in whom acute hepatitis B rapidly progressed to chronic active liver disease and cirrhosis is described. Absent circulating IgA, significantly low IgG, and normal IgM levels were detected during the acute phase of illness. Enumeration of peripheral lymphocytes revealed a decreased number of T cells and normal numbers of B cells. *In vitro* pokeweed stimulation of immunoglobulin synthesis correlated with the *in vivo* circulating levels of the three immunoglobulins. Cell-mediated immune responses were normal except for lymphocyte stimulation to hepatitis B surface antigen. It is concluded that the defective synthesis of IgG and IgA antibodies to hepatitis B surface antigen contributed to the accelerated progression to chronic active type B hepatitis in this patient.

4147 ON THE PATHOGENESIS OF EARLY RENAL IMPAIRMENT IN CHRONIC ACTIVE LIVER DISEASES (CALD) [Abstract]. (Eng.) Gentilini, P.; Laffi, G.; Buzzelli, G.; Stefani, P.; Masi, R. (III. Dept. Medical Pathology, Univ. Florence, Florence, Italy). *Digestion* 16(4):348-349; 1977.

See also, 4087, 4104, 4109, 4110, 4115, 4149.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

4148 GIANT MITOCHONDRIA IN HEPATOCYTES: A DIAGNOSTIC HINT FOR ALCOHOLIC LIVER DISEASE. (Eng.) Bruguera, M.; Bertran, A.; Bombi, J. A.; Rodes, J. (Hospital Clinico y Provincial, Barcelona, Spain). *Gastroenterology* 73(6):1383-1387; 1977.

One hundred and sixty-five coded liver biopsy specimens from chronic alcoholics and specimens from nondrinkers or subjects with low alcoholic intake were studied by light microscopy to evaluate the occurrence and diagnostic significance of giant mitochondria, which have been identified as PAS-negative globular hyalin cytoplasmic inclusions of regular outline, clearly distinguishable from Mallory bodies. In four cases, electron microscopy confirmed that these globules were in fact enlarged mitochondria. The incidence of giant mitochondria was significantly higher in patients with high alcohol consumption (72%) than in those with low or no alcohol intake (10%). Their presence was related to the amount of daily ethanol consumption and to the shortness of abstinence before the biopsy. It was independent of other changes in the liver, and was detected with similar frequency in biopsies showing different alcoholic liver diseases. This study emphasizes that giant mitochondria may be detected by light microscopy in a high proportion of alcoholics, and rarely in nonalcoholic liver diseases. Although less specific, they are much more frequent than Mallory bodies. Consequently, they should be considered as a diagnostic hint of recent and heavy alcoholism.

4149 ASYMPTOMATIC LIVER DISEASE IN ALCOHOLICS.

(Eng.) Bruguera, M.; Bordas, J. M.; Rodes, J. (Hospital Clinico y Provincial, Barcelona, Spain). *Arch. Pathol. Lab. Med.* 101(12):644-647; 1977.

The incidence and nature of liver damage were examined in 154 consecutive asymptomatic chronic alcoholics, and the value of clinical and biochemical examination for predicting the presence of liver disease was assessed. Several types of histologic changes of the liver (cirrhosis, hepatitis, fatty change, hemosiderosis, portal fibrosis) were found in 116 of the alcoholics. No relation was found between the nature of the hepatic damage and either the duration of alcoholism or the presence or degree of clinical and biochemical disturbances. The results of clinical and biochemical examination (presence or absence of hepatomegaly, presence of one or more biochemical abnormalities) of 55 patients with histologic abnormalities were normal, and these patients were considered as apparently healthy alcoholics. Liver biopsy specimens from 61 of 69 asymptomatic alcoholics, who had abnormalities on clinical and/or biochemical investigation, showed hepatic damage under light microscopy, but specimens from the other eight were histologically normal. Conventional liver function tests have limited value in detecting the existence and severity of liver injury, while liver biopsy specimens may reveal a large range of abnormalities in asymptomatic alcoholics.

4150 MEASUREMENT OF ALCOHOL-RELATED EFFECTS IN MAN: CHRONIC EFFECTS IN RELATION TO LEVELS OF ALCOHOL CONSUMPTION. PART A.

(Eng.) Turner, T. B.; Mezey, E.; Kimball, A. W. (Johns Hopkins Medical Inst., Baltimore, MD). *Johns Hopkins Med. J.* 141(5):235-248; 1977.

Information concerning intake-effect relations between alcohol intake and chronic dysfunctions of the liver, pancreas, cardiovascular system, testis, and fetus are reviewed. Alcohol and the elderly, evidence of favorable effects of alcohol, and the question of alcoholism are also discussed. In the majority of studies, the documented daily intake levels have been over 150 g of ethanol (the equivalent of 1 pint of 80-proof spirits), often in the range of 250-300 g. Other potential risk factors such as malnutrition are rarely considered, and little information is available on the effects of more moderate daily intake. The liver emerges as the organ most vulnerable to regular alcohol use, with the hazardous range beginning at a daily intake of 80-100 g of ethanol. There is some evidence of beneficial effects, especially in the elderly, of daily intakes of 15-30 g, and epidemiological evidence exists of a lower incidence of myocardial infarction in those with a daily intake approximating 56 g. More information is needed on chronic intake-effect relationships, particularly at levels below 150 g.

4151 CHEMICAL NATURE OF ALCOHOLIC HYALIN.

(Eng.) Luisada-Opper, A. V.; Kanagasundaram, N.; Leevy, C. M. (Coll. Medicine and Dentistry of New Jersey, Newark, NJ 17103). *Gastroenterology* 73(6):1374-1376; 1977.

The nature of protein components present in a purified alcoholic hyalin preparation was investigated. Alcoholic hyalin was prepared from postmortem livers of patients with alcoholic liver disease and purified by discontinuous sucrose density gradient ultracentrifugation. The purified protein preparation contained about 12% reducing sugar, the remainder being protein. Gel filtration on a Sephadex 4B column showed the presence of three peaks. The material in each peak contained acetylglucosamine, hexosamine, and deoxysugar (calculated as rhamnose). That these protein components are glycoprotein in nature was confirmed by polyacrylamide gel electrophoresis followed by scanning the gels at 280 nm and then at 520 nm (after staining the gels with PAS base reagent for the presence of carbohydrate).

4152 ALCOHOLIC HYALIN ANTIGEN (AHAg) AND ANTIBODY (AHAb) IN ALCOHOLIC HEPATITIS.

(Eng.) Kanagasundaram, N.; Kakumu, S.; Chen, T.; Leevy, C. M. (Coll. Medicine and Dentistry of New Jersey, 100 Bergen St., Newark, NJ 17103). *Gastroenterology* 73(6):1368-1373; 1977.

Serum and tissue from subjects without liver disease and from patients with various hepatic diseases were studied by complement fixation (CF) and immune adherence (IA) hemagglutination tests to characterize alcoholic hyalin (AH) isolated from human postmortem liver, to determine the diagnostic value of AH antigen (AHAg), and to investigate the occurrence and significance of tissue immune complexes in alcoholic hepatitis. Isolated purified AH was used to produce AH antibody (AHAb) in rabbits. Rabbit antiserum was added to heat-inactivated human serum to detect AHAg; purified AH was added to serum and tissue eluates to detect AHAb. AHAg was present in the serum of each of 15 patients with early phase alcoholic hepatitis in CF titers of 8 to 64 and IA titers of 16 to 2,048. AHAg became negative within 3 to 5 weeks with abstinence from alcohol and was followed by transient appearance of AHAb. AHAb was present in 11 patients with advanced phases of alcoholic hepatitis in CF titers of 8 to 640 and IA titers of 16 to 4,096. Four patients in this group exhibited concomitant AHAb and AHAg. Investigations of liver tissue eluate reveal that patients with advanced alcoholic hepatitis or active alcoholic cirrhosis have AHAg-reactive immune complexes containing IgG and IgA.

4153 CLINICOPATHOLOGICAL STUDY OF ALCOHOLIC LIVER INJURY IN JAPAN [Abstract]. (Eng.) Inoue, K.; Sato, E. (Toyama Medical and Pharmaceutical Sch., Tohama, Japan). *Gastroenterol. Jpn.* 12(4):340; 1977.

4154 A PATHOGENESIS OF ALCOHOLIC LIVER INJURY [Abstract]. (Eng.) Okabe, K. (St. Marianna Univ. Sch. Medicine, Kanagawa, Japan). *Gastroenterol. Jpn.* 12(4):339-340; 1977.

See also, 3844, 3880, 3887, 3895, 4087, 4104, 4113, 4115, 4174, 4175.

LIVER AND BILIARY TRACT

Cirrhosis

4155 HEPATIC KINETICS OF ^{99m}TECHNETIUM SULFUR COLLOID IN CIRRHOSIS. (Eng.) George, E. A.; Shields, J. B.; Cabal, E. C.; Schulz, R. C.; Donati, R. M. (St. Louis Veterans Admin. Hosp., St. Louis, MO 63125). *J. Nucl. Med. All. Sci.* 21 (3):107-112; 1977.

Experience with an index of hepatic arterial and portal venous circulation determined by analysis of the kinetic sequence of events that followed the peripheral venous injection of ^{99m}technetium (^{99m}Tc) sulfur colloid in 97 subjects is presented. Evaluation of portal hemodynamics during the first hepatic transit of ^{99m}Tc sulfur colloid by sequential hepatic imaging (visual evaluation) and by computer-assisted calculation of percent portal extraction of the radiocolloid suggested good correlation with the clinical entity. Percent portal hepatic extraction of sulfur colloid correlated well with corrected hepatic wedge pressure obtained in 20 control patients and in 42 patients with uncomplicated cirrhosis. Slight to moderately elevated corrected hepatic wedge pressure appeared to inversely parallel the degree of diminished percentage of portally extractable radiocolloid. Portasystemic shunting, which tends to normalize corrected hepatic wedge pressure, may decrease further portal extraction until undetectability, which, however, compares better with the abnormal hepatic hemodynamics at hand than a normal hepatic wedge pressure gradient. Similarly, prehepatic portal hypertension secondary to portal or mesenteric thrombosis was not reflected by an elevated corrected hepatic wedge pressure but was well demonstrated by the radionuclide technique. The data suggest that the technique of the calculation of percentage of portally extractable sulfur colloid could serve as a sensitive indicator for the detection, progression, or recovery from hepatic hemodynamic abnormalities. The technique, however, does not offer an index of portal pressure gradients in advanced cirrhosis and postsurgical portasystemic shunting.

4156 IS PRIMARY BILIARY CIRRHOSIS AN IMMUNE COMPLEX DISEASE? (Eng.) Thomas, H. C.; Potter, B. J.; Sherlock, S. (Royal Free Hosp., London, England). *Lancet* 2(8051):1261-1263; 1977.

The possibility that primary biliary cirrhosis is related to immune complex liver injury is discussed. Large immune complexes are present in the circulation of patients with primary biliary cirrhosis and result in the activation of complement by the classical pathway. Such large complexes are capable of producing tissue damage. The granulomatous lesions surrounding the small bile ducts within the liver of patients with primary biliary cirrhosis and the vasculitis, rheumatoid arthritis, and associated lesions are all compatible with immune complex injury. It is postulated that such large complexes could be formed in the vicinity of the bile ducts by an antigen absorbed from the bile or biliary epithelium. Complexes reaching the systemic circulation might be responsible for the associated extrahepatic diseases.

4157 ASSOCIATION OF HUMAN LEUKOCYTE ANTIGEN (HLA)-B5 AND -BW22-J WITH HEPATIC CIRRHOSIS OF APPARENTLY UNKNOWN ETIOLOGY. (Eng.) Ohkubo, A.; Okimoto, K.; Iwasaki, Y.; Kosaka, K.; Juji, T.; Tohyama, H. (Faculty Medicine, Univ.

Tokyo, Tokyo 113, Japan). *Tohoku J. Exp. Med.* 123 (3):257-263; 1977.

The association of histocompatibility antigens HLA-BW22-J (a Japanese-specific HLA antigen) and HLA-B5 with hepatic cirrhosis of unknown etiology was studied in 29 patients with histologically proven hepatic cirrhosis (based on needle biopsy) and in 128 healthy controls, all randomly selected. HLA types were determined for the first (A) and the second (B) loci by the lymphocytotoxicity technique. Of the 29 patients, 5 were positive for hepatitis B surface antigen (HBsAg), and 4 had cirrhotic patients in their families, 2 of which cases were HBsAg-positive. Twenty-one of the 29 patients were positive for HLA phenotype B5 and 11 for phenotype BW22-J. Forty-one of the 128 controls were positive for B5 and 13 for BW22-J. The differences in frequencies of B5 and BW22-J between the patients and the controls were statistically significant ($p<0.003$ and relative risk=5.57 for B5, and $p<0.01$ and relative risk=5.40 for BW22-J). The results suggest that a predisposition linked to HLA-associated genes plays an important role in development of hepatic cirrhosis of unknown etiology in Japan; further studies are required that will bear upon prevention and treatment of this entity.

4158 RELATIVE CONCENTRATIONS OF INDIVIDUAL NONSULFATED BILE ACIDS IN THE SERUM AND BILE OF PATIENTS WITH CIRRHOSIS.

(Eng.) Struthers, J. E., Jr.; Mehta, S. J.; Kaye, M. D.; Naylor, J. L. (Veterans Admin. Hosp., 1055 Clermont St., Denver, CO 80220). *Am. J. Dig. Dis.* 22(10):861-865; 1977.

The relative concentrations of individual nonsulfated bile acids were determined in samples of serum and bile obtained simultaneously from 16 patients with biopsy proven alcoholic cirrhosis. A highly significant ($p<0.001$) correlation was found between the fasting relative concentrations of each of the three major bile acids (cholic, chenodeoxycholic, and deoxycholic) in serum and bile. This relationship persisted after manipulation of bile acid pools produced by feeding individual bile acids (250, 100, and 100 mg, 4x/day for cholic, deoxycholic, and taurodeoxycholic acids, resp.) for 4 days. It is concluded that the relative concentrations of individual nonsulfated bile acids in serum accurately reflect those in bile and that measurement of individual serum bile acids may be used for screening and serial determination purposes. In particular, low levels of biliary deoxycholate can be reliably predicted by serum measurements.

4159 FIBRIN-FIBRINOGEN DEGRADATION PRODUCTS IN HEPATIC CIRRHOSIS.

(Eng.) Bulajic, M.; Kovacevic, N.; Lalic, M.; Rolovic, Z. (Medical Faculty, Univ. Beograd, Beograd, Yugoslavia). *Acta Med. Iugosl.* 31(4):333-338; 1977.

To investigate the possible role of disseminated intravascular coagulation in the pathogenesis of hemorrhage in hepatic cirrhosis, the severity of liver damage was correlated with the concentration of serum fibrin-fibrinogen degradation products in 14 patients with compensated or noncompensated liver cirrhosis. Increased fibrin-fibrinogen degradation products were found only in three of the six patients with alcoholic cirrhosis. Although there were differences in the level of fibrin-fibrinogen degradation products in patients with decompensated and compensated cirrhosis, this difference was not statistically significant. It is concluded that the frequency of the elevated fibrin-fibrinogen degradation products in cirrhosis is low. Other factors must be sought to account for hemorrhage in cirrhosis.

4160 ASSOCIATION OF ABNORMAL FIBRIN POLYMERISATION WITH SEVERE LIVER DISEASE.

(Eng.) Green, G.; Poller, L.; Thomson, J. M.; Dymock, I. W. (Rancho Los Amigos Hosp., Downey, CA 90242). *Gut* 18(11):909-912; 1977.

To investigate the frequent occurrence of abnormal fibrin polymerization reported in patients with liver disease, fibrin polymerization was studied in 68 patients with cirrhosis or chronic active liver disease. Thirty-three of these patients demonstrated impairment of this phase of blood coagulation. When other tests of liver function were compared in patients with this abnormality and in those in whom fibrin polymerization was normal, the former group demonstrated significantly reduced albumin concentrations ($p<0.0002$), raised bilirubin and aspartate amino transferase levels ($p<0.0006$ and <0.003, resp.), and greater prolongation of the one-stage prothrombin time ($p<0.001$) with more marked reduction in factor VII levels ($p<0.002$) compared with the latter patients. It is concluded that defective fibrin polymerization occurring in patients with liver disease indicates the presence of severely impaired hepatocellular function. This fact might account for the grave prognosis reported in cirrhotic patients with abnormal fibrin polymerization who also suffer bleeding from gastroesophageal varices.

4161 HEPARIN ELIMINATION IN PATIENTS WITH LIVER CIRRHOSIS.

(Eng.) Teien, A. N. (Aker Hosp., Oslo 5, Norway). *Thromb. Haemostas.* 38(3):701-706; 1977.

Heparin metabolism was studied in six patients with liver cirrhosis and normal renal function and in six normal subjects. Heparin (100 U/kg) was injected i.v., and heparin concentration in plasma was determined by polybrene titration. The mean heparin half-life was 117.8 min in the patients as compared to 74.0 min in the controls ($p=0.02$). The heparin half-life was correlated to galactose half-life in the patients ($r=0.83$, $p=0.05$). The findings suggest that heparin is metabolized in the liver. There was a significant decrease in antithrombin III activities in the controls, but not in the patients. A possible explanation may be that the normal liver removes heparin bound to antithrombin III, and that this function is impaired in liver cirrhosis.

4162 ABSORPTION, HYDROXYLATION, AND EXCRETION OF VITAMIN D_3 IN PRIMARY BILIARY CIRRHOSIS.

(Eng.) Krawitt, E. L.; Grundman, M. J.; Mawer, E. B. (Dept. Medicine, Univ. Vermont, Burlington, VT). *Lancet* 2(8051):1243-1249; 1977.

The absorption of a p.o. dose of ^{3}H-vitamin D_3 and the 25-hydroxylation of i.v. administered ^{14}C-vitamine D_3 were studied simultaneously in six patients with primary biliary cirrhosis and in four controls. Vitamin D_3 (3 μg, 8 μCi, p.o.) was poorly absorbed by four of the six patients with primary biliary cirrhosis; absorption was negatively correlated with fecal fat excretion. 25-Hydroxylation of p.o. or i.v. vitamin D_3 was not impaired in the patients compared with controls of similar vitamin D nutritional status. Urinary radioactivity derived from the i.v. dose of vitamin D_3 (25 μg, 2 μCi) was significantly greater in patients than in controls (mean excretion 9.1 ± 2.6% of injected dose in patients, 2.8 ± 0.4% in controls) and was positively correlated with the serum bilirubin concentration ($r=0.92$, $p=0.005$). Urinary excretion may lead to loss of administered and endogenous vitamin D and thus contribute to vitamin D deficiency in patients with primary biliary cirrhosis.

4163 DETECTION OF HEPATOMA IN LIVER CIRRHOSIS.

(Eng.) Moreau, R.; Soussaline, F.; Chauvaud, S.; Parmentier, C.; Di Paola, R.; Charbord, P.; *et al.* (Laboratoire des Isotopes, Inst. Gustave-Roussy, F-94800 Villejuif, France). *Eur. J. Nucl. Med.* 2(3):183-188; 1977.

Double isotope scintigraphies with ^{67}Ga citrate and ^{99m}Tc sulfur colloid were used with digital subtraction, after simultaneous recording of ^{99m}Tc and ^{67}Ga data on magnetic tape (by an interface) in 33 cirrhotic patients for the detection of hepatoma. Hepatoma was diagnosed histologically in six cases. Using this double isotope technique, there were no false-positives in subtraction scintigrams. There was one false-negative because of the lack of significance in the subtracted image for one of the six patients with liver cancer. For three of the six patients with hepatoma, the ^{67}Ga scintigram showed an increased uptake in the tumor area. For the three other cases, the ^{67}Ga uptake was equilibrated throughout the liver scintigraphy. The subtraction technique is of greatest value in cases where the ^{67}Ga scintigram shows no increased activity, as it permitted the diagnosis of hepatoma in two cases.

4164 SERUM Gc SYSTEM IN LIVER CIRRHOSIS AND HEPATOMA.

(Eng.) Theodoropoulos, G.; Rigatos, G.; Babionitakis, A.; Archimandritis, A.; Fertakis, A.; Melissinos, K. (2, Dryadon St., Chalandri-Athens, Greece). *Hum. Genet.* 39(2):225-228; 1977.

Serum group specific component (Gc) polymorphism was studied in 85 Greek patients with liver cirrhosis, in 65 with cirrhosis plus hepatoma, and in 40 with hepatoma without cirrhosis. Six hundred unrelated healthy Greeks served as controls. The Gc 1-1 phenotype was found more frequently ($p<0.0005$-0.05) in patients with cirrhosis (with or without hepatoma), and the incidence of the Gc^1 allele was significantly higher ($p<0.001$-0.05) in patients with cryptogenic hepatitis B surface antigen (HBsAg)-negative cirrhosis. On the other hand, the Gc 2-2 phenotype was found about three times more frequently in patients who had hepatoma without cirrhosis, and the incidence of the Gc^2 allele was significantly higher in the same group than in the controls. The Gc^1 and the Gc^2 alleles apparently predispose, under the influence of various factors, the development of cryptogenic cirrhosis and hepatoma without cirrhosis, resp.

4165 ENCEPHALOPATHY IN PATIENTS WITH CIRRHOSIS OF THE LIVER. A NEUROPSYCHOLOGICAL STUDY.

(Eng.) Elsass, P.; Lund, Y.; Ranek, L. (Rigshospitalet, Copenhagen, Denmark). *Scand. J. Gastroenterol.* 13(2):241-247; 1978.

Neuropsychological tests and clinical ratings of consciousness level were performed in 30 patients with encephalopathy due to biopsy-proven liver cirrhosis of various etiology. The results were compared to test norms for patients with diffuse cerebral lesions to give a neuropsychological description of the encephalopathic state of patients with these two entities and to investigate whether the neuropsychological characterization of the encephalopathic course differs between patients with a portacaval anastomosis and patients without this operation. The level of consciousness was evaluated on the basis of such criteria as blurred speech; slow, inert reactions; sleepiness; psychomotor uneasiness; apathy; lack of spontaneity; absentmindedness; emotional instability; euphoria; and bizzare behavior. Neuropsychological tests included subtraction, block design/hidden patterns, visual gestals, digit span, word fluency, and story recall/picture recognition. All patients were tested once with both tests to investigate the state of encephalopathy. To investigate the course of encephalopathy, eight patients with portacaval anastomosis were also tested after the surgery, and eleven unoperated patients were tested once a week during 3 weeks. The neuropsychological tests were graded according to the norms for diffuse cerebral lesion and showed that three-fifths of the patients had intellectual impairments while the remaining two-fifths had an intact level of functioning. However, according to clinical ratings, one-third showed a suspect lowered level of consciousness without general intellectual impairment, while one-tenth had slight intellectual impairment but a normal level of consciousness. In all cases of lowered level of consciousness, the function of attention was impaired; the functions of memory and abstraction were less impaired than attention. In the eight patients with portacaval anastomosis, the level of consciousness varied, generally deteriorated in parallel with liver function, and could vary hourly; this group showed significant ($p<0.01$-0.02) reductions in the scores of memory and abstraction tests, which is characteristic of intellectual impairment in diffuse cerebral lesions. The patient group without portacaval anastomosis showed variations in level of consciousness similar to those of the operated group but no significant deteriorations in any of the test results within the investigations performed. The level of attention is an important part of the clinical picture in encephalopathy due to liver cirrhosis and differentiates well between patients with diffuse cerebral lesions and those with hepatic encephalopathy. The cerebral effect of portacaval anastomosis appears as an intellectual deterioration and produces a different course of cerebral affection than that seen in patients without this operation.

4166 EFFECT OF VEGETABLE AND ANIMAL PROTEIN DIETS IN CHRONIC HEPATIC ENCEPHALOPATHY.

(Eng.) Greenberger, N. J.; Carley, J.; Schenker, S.; Bettinger, I.; Stamnes, C.; Beyer, P. (Kansas Univ. Medical Center, 39 and Rainbow, Kansis City, KS 66103). *Am. J. Dig. Dis.* 22(10):845-855; 1977.

The effect of a vegetable protein diet as compared to an animal protein diet on standard clinical and laboratory parameters was examined in three patients with chronic hepatic encephalopathy. To evaluate more objectively the effects of vegetable or animal protein diets, an hepatic encephalopathy index was developed, and this included the following parameters: fetor hepaticus, asterixis, stage of hepatic coma (Parson-Smith), arterial ammonia levels, EEG, Reitan trail test, and any reduction or improvement in dietary protein tolerance. In controlled, randomized, single-blind trials, it was found that a vegetable protein diet resulted in overall clinical improvement, decreased hepatic encephalopathy index scores, decreased arterial ammonia levels, improved performance on intellectual tasks, and in one case, markedly improved protein tolerance. Further, the beneficial effects of a vegetable protein diet were enhanced by the use of lactulose. These studies do not provide a clear-cut definition of the mechanism for the observed beneficial effects of vegetable protein in chronic hepatic encephalopathy. However, the most plausible explanation is that vegetable protein diets contain lower amounts of certain amino acids and other materials that may be important in the pathogenesis of hepatic encephalopathy.

4167 INCREASED CONCURRENCE OF CIRRHOSIS AND BACTERIAL ENDOCARDITIS: A CLINICAL AND POSTMORTEM STUDY.

(Eng.) Snyder, N.; Atterbury, C. E.; Correia, J. P.; Conn, H. O. (Veterans Admin. Hosp., West Haven, CT 06516). *Gastroenterology* 73(5):1107-1113; 1977.

To test the hypothesis that spontaneous bacterial peritonitis in cirrhosis is caused by the infection of pre-existing ascites by blood borne bacteria (making other sites vulnerable to infection), the frequency of bacterial endocarditis in cirrhotic and noncirrhotic patients was determined. At autopsy, bacterial endocarditis was found in 1.8% of 557 cirrhotic patients compared to 0.9% of 3,658 noncirrhotic patients ($p<0.06$), despite the expected negative association predicted by Berkson's hypothesis. There was no such association between bacterial endocarditis and either myocardial infarction or emphysema. There were highly significant negative associations between glioblastoma multiforme and cirrhosis ($p<0.01$), myocardial infarction ($p<0.01$), and emphysema ($p<0.02$). Among the 41,151 patients admitted to the hospital, bacterial endocarditis was observed in 0.1% of the noncirrhotic patients compared to 0.34% of the cirrhotic patients ($p<0.001$). The bacterial endocarditis in cirrhosis differed from the conventional syndrome in several ways. Nonrheumatic heart disease, especially calcific aortic stenosis, occurred more frequently in noncirrhotic than in cirrhotic patients. Enteric bacteria are responsible for a higher percentage and α-hemolytic streptococci for a lower percentage of cirrhotic bacterial endocarditis than in conventional bacterial endocarditis. The association between cirrhosis and bacterial endocarditis supports the postulated hematogenous route of infection in spontaneous bacterial peritonitis.

4168 HEPATOMEGALY AND RECURRENT ASCITES IN AN 11-YEAR-OLD BOY.

(Eng.) Tang, T. T.; Davis, S.; Keelan, M. H.; Lepley, D., Jr.; Babbitt, D. P. (Milwaukee Children's Hosp., P.O. Box 1997, Milwaukee, WI 53201). *J. Pediatr.* 91(6):1015-1020; 1977.

A case of hepatomegaly and recurrent ascites in an 11-yr-old boy is described. The boy was admitted to a hospital because of increasing abdominal girth. A liver scan suggested a "lymphatic disease" in the left lobe. At exploratory laparotomy the portal pressure was 260 mm H_2O; liver biopsy showed cirrhosis of unknown etiology. Upon a second admission 1 month later, the boy had a proturberant abdomen and the liver edge extended 5 cm below costal margin. At laparotomy, 1,300 ml of clear ascitic fluid was aspirated; normal venous flow and portal pressure were observed in the liver. A liver biopsy was diagnosed as hepatoportal sclerosis with focal cirrhosis; a liver scan was suggestive of cirrhosis. After discharge, the boy's condition remained stable, but 4 months later he was readmitted for paracentesis, and 4,300 ml of amber clear fluid was aspirated. He was treated with hydrochlorothiazide and multivitamins with iron but the ascites recurred. Chest roentgenograms showed minimally enlarged heart and prominent superior vena cava. On the basis of the information available the diagnoses considered were idiopathic cirrhosis, alpha$_1$-antitrypsin deficiency, constrictive pericarditis, and cardiac myxoma. The possibility of constrictive pericarditis was confirmed by careful examination, including inspection of neck veins and determination of atrial, ventral, and hepatic wedge pressures. A thoracotomy was performed, and the pericardium was removed except for a minute shelf on the back of the left atrium. About 4 months later, intracardiac pressures had returned to normal, and the ascites had completely subsided. One year later, the pressure contour in the right ventricle had become nearly normal, and the early diastolic dip had disappeared. Retrospectively, veno-occlusive disease was suspected on the basis of liver biopsies, but histological and microbiological examination of pericardium gave no clues of possible etiology of constrictive pericarditis. This classic case of idiopathic constrictive pericarditis is an extremely important case for clinical practice, illustrating the critical nature of careful physical examination that would have lead to the correct diagnosis sooner.

4169 HYPOXEMIA OF CIRRHOSIS: DETECTION OF ABNORMAL SMALL PULMONARY VASCULAR CHANNELS BY A QUANTITATIVE RADIONUCLIDE METHOD.

(Eng.) Wolfe, J. D.; Tashkin, D. P.; Holly, F. E.; Brachman, M. B.; Genovesi, M. G. (Univ. California Sch. Medicine, Los Angeles, CA 90024). *Am. J. Med.* 63 (5):746-754; 1977.

The pathophysiology of hypoxemia (arterial oxygen tension [PaO_2] 48.5-68 mm Hg) in three patients with hepatic cirrhosis was investigated using conventional cardiopulmonary tests and a special radionuclide technique for the detection of shunting through small dilated pulmonary vessels. Pulmonary function tests revealed normal spirometry and lung volumes, normal closing volume and single-breath nitrogen washout, abnormal diffusing capacity (41-68% of predicted), increased venous admixture of 100% oxygen (8.1-29%), and a decrease in PaO_2 after change from the supine to the sitting position and after exercise. Cardiac catheterization revealed normal pulmonary arterial pressures at rest and during exercise, increased cardiac outputs, and no intracardiac shunts. Chest roentgenograms and pulmonary angiograms were within normal limits. Using a quantitative radionuclide technique, 10%, 46%, and 70.5% of i.v.-injected technetium 99m-macroaggregated albumin (^{99m}Tc-MAA) particles traversed the pulmonary vasculature and lodged in end-organ systemic capillary beds in the three patients with cirrhosis compared with 6% or less in eight controls. The results document the presence of dilated pulmonary capillaries and/or arteriovenous communications that are too small to be detected angiographically. These abnormal vascular channels can account for the hypoxemia observed in patients with liver cirrhosis, primarily on the basis of diffusion/perfusion imbalance and to a lesser extent by true shunting.

4170 DISPOSITION OF NAFCILLIN IN PATIENTS WITH CIRRHOSIS AND EXTRAHEPATIC BILIARY OBSTRUCTION.

(Eng.) Marshall, J. P., II; Salt, W. B.; Elam, R. O.; Wilkinson, G. R.; Schenker, S. (Vanderbilt Univ. Sch. Medicine, Nashville, TN 37203). *Gastroenterology* 73(6):1388-1392; 1977.

The effect of cirrhosis and extrahepatic biliary obstruction on the pharmacokinetics of nafcillin was studied in 12 controls, 12 patients with cirrhosis, and 5 patients with extrahepatic biliary obstruction. The plasma clearance of nafcillin in controls was 583 ± 144.2 ml/min and fell strikingly to 291 ± 147.6 and 163 ± 56.3 ml/min in patients with cirrhosis and extrahepatic obstruction, resp. ($p<0.001$). In the latter two groups, nafcillin excreted in urine increased from about 30% to 50% of the administered dose ($p<0.02$), suggesting that renal disease superimposed on hepatic disease would further decrease overall nafcillin clearance. The depression of nafcillin clearance with hepatobiliary disease did not correlate with any conventional liver laboratory test. The initial volume of distribution of nafcillin was unaltered, but at steady state there was a significant reduction in the distribution volume in the patients with liver disease. Accordingly, the impairment in drug elimination, as assessed by its plasma clearance, was underestimated by the prolongation of the nafcillin elimination half-life, which was 1.02 ± 0.20 hr in controls and 1.23 ± 0.31 ($p>0.05$) and 1.73 ± 0.44 hr ($p<0.03$), resp., in patients with cirrhosis and extrahepatic obstruction.

4171 KALLIKREIN-KININ AND RENIN-ANGIOTENSIN SYSTEMS IN FUNCTIONAL RENAL FAILURE OF CIRRHOSIS OF THE LIVER.

(Eng.) Wong, P. Y.; Talamo, R. C.; Williams, G. H. (Albany Medical Coll., Albany, NY 12208). *Gastroenterology* 73(5):1114-1118; 1977.

The possibility that abnormal kallikrein-kinin and renin-angiotensin systems may be responsible for functional renal failure was investigated in 15 patients with liver cirrhosis. Seven of these patients (control group) had persistent ascites, prothrombin time more than 3 sec above controls, and normal blood urea nitrogen and serum creatinine. The remaining eight patients had hepatorenal (HR) syndrome (functional renal failure) in alcoholic liver disease. All patients had been on a low sodium (<10 mEq/24 hr) diet for 5 to 6 days. Fasting supine, overnight blood samples were then drawn between 8 and 10 AM. The mean plasma prekallikrein as determined by the tosyl arginine methyl ester (TAMe) esterase method for control patients was 11.6 ± 2.8, whereas that of the HR group was 2.5 ± 1 μM/hr, $p<0.007$ (normal: 95 ± 3.75). The mean plasma bradykinin for the controls was 1 ± 0.44 and that of the HR group was 0.23 ± 0.01 ng/ml, $p<0.001$ (normal: 3.5 ± 1). The mean plasma renin activity for the control group was 26.4 ± 12 and that of four patients in the HR group was 50.4 ± 23 ng/ml/hr (normal: 5.28 ± 1), the difference was not significant despite the elevation in HR patients. The mean angiotensin II for the control group was 94.4 ± 33 and that of the HR group was 356.5 ± 122 pg/ml, $p<0.03$ (normal: 57 ± 7). The combined effects of excess in vasoconstrictor hormone (angiotensin II) and deficiency of a renal vasodilator (bradykinin) may be etiologic in the pathogenesis of HR syndrome.

4172 THE DIAGNOSIS OF THE SITE OF UPPER GASTROINTESTINAL HAEMORRHAGE IN PATIENTS WITH ESTABLISHED PORTAL HYPERTENSION.

(Eng.) Mitchell, C. J.; Jewell, D. P. (St. James' Hosp., Leeds LS9 7TF, England). *Endoscopy* 9(3):131-135; 1977.

e findings of 75 endoscopies performed in 60 pa-
ents known to have esophageal varices and who
esented with further upper gastrointestinal hem-
rhage during the previous 72 hr are presented. A
e of active bleeding was found at 50 of the 75
aminations. Endoscopy was performed within 3 hr
the last bleeding episode in 21 patients, and
e site of hemorrhage was detected in all of them.
e bleeding site was determined in only four of
ght patients who were endoscoped 24-48 hr after
morrhage. Variceal bleeding alone was seen in
of these 50 examinations, while only six patients
re bleeding from mucosal lesions alone. Both
rices and mucosal lesions were bleeding in four
tients. An adult end-viewing duodenoscope was
ed in 45 endoscopies, and bleeding from esopha-
al varices restarted during the procedure in three
tients; one patient remained unconscious for 24 hr
llowing i.v. diazepam administration. A pedia-
c endoscope was used for 30 examinations, and a
l examination was achieved in each patient. No
dation was required, and the procedure was free
complications. The pediatric endoscope is
garded as the instrument of choice for patients
own to have portal hypertension and who present
th upper gastrointestinal hemorrhage.

73 PORTAL HYPERTENSION AND TRANSHEPATIC EMBOLISATION OF GASTRO-OESOPHAGEAL VAR-
S. (Eng.) Casselden, P. A. (Royal Free
p., London, England). *Radiography* 43(514):
-228; 1977.

e pathology of portal hypertension is outlined
gether with the formation and treatment of gastro-
ophageal varices. Portal hypertension is invari-
y caused by an obstruction of the portal vein
newhere along its course and may anatomically be
assified into pre- and postsinusoidal intra- and
trahepatic obstruction. When the portal circula-
on is obstructed either extra- or intrahepati-
lly, it is normal to find the development of a
llateral circulation carrying portal blood to the
stemic veins. The treatment of esophageal and
stric varices may be accomplished by the follow-
g procedures: blood transfusion; the administra-
on of vasopressin to lower the portal pressure;
e insertion of a Sengstaken tube and balloon;
rgical intervention that includes localized
vascularization of the varices, portasystemic
unts, and subcardiac porta-azygos disconnection;
literation of varices by esophagoscopy; and trans-
patic portography. Transhepatic portography to-
ther with the selective catheterization of esoph-
eal and gastric varices has been developed with
couraging short-term results. Although emboliza-
on of varices does not cure portal hypertension
d is not the ideal treatment since further col-
teral veins may form, the flow in existing veins
interrupted, and it is hoped that the blood will
ss through other veins less prone to bleeding,
., the renal vein. Patients selected for em-
lization of varices all have a history of exten-
ve hemorrhage and are considered at high risk with
or operative and postoperative prognosis. The
ly contraindications to this technique appear to
be excessive bleeding, hepatic mass, or hydatid disease. Although no control series has been completed for selective catheterization and obliteration of bleeding varices, all cases that have been followed with transplenic venography reveal that the portal vein is patent and that the majority of successfully embolized varices remain thrombosed. The longest follow-up to date is 1 yr, and no further hemorrhaging has occurred in this patient.

4174 OPERATIVE RESULTS IN PORTAL HYPERTENSION WITH BLEEDING OESOPHAGEAL VARICES. (Eng.)

Bergan, A.; Flatmark, A. (Natl. Hosp. Norway, Univ. Clinic, Oslo, Norway). *Scand. J. Gastroenterol.* 12(6):677-682; 1977.

The results of surgery in 81 patients who were treated during a 15-yr period for bleeding esophageal varices complicating portal hypertension are presented. Nearly 90% had liver cirrhosis, and 21% were alcoholics. Sixty-seven portasystemic shunts were performed in 63 patients; 11 of these were emergency procedures. The overall operative mortality in electively shunted patients was 10.7%. Even in those with the most severe liver insufficiency (child's group C), operative mortality was below 20%. Operative mortality in the elective cases was closely correlated to peroperative bleeding. Only 1 of 45 patients needing less than 10 units of blood peroperatively died, while mortality in the multitransfused group was 45.5%. Both patients who survived urgent shunt surgery were operated on early, i.e., before they had received 5 units of blood each.

4175 CIRRHOTIC PORTAL HYPERTENSION: MORBIDITY OF CONTINUED ALCOHOLISM. (Eng.)

Pande, N. V.; Resnick, R. H.; Yee, W.; Eckardt, V. F.; Shurberg, J. L. (Lemuel Shattuck Hosp., 170 Morton St., Boston, MA 02130). *Gastroenterology* 74(1):64-69; 1978.

The morbidity of continued alcoholism was examined in 172 cirrhotic patients who had been randomized for participation in controlled trials of portacaval shunts. Of 159 patients surviving more than 30 days, 76 continued drinking (group A), 68 abstained (group B), and 15 (group C) were chronically institutionalized (without potential access to alcohol). The mean number of days in hospital (postrandomization) and the prevalence of bleeding varices, ascites, and encephalopathy were similar for groups A and B ($p>0.05$ for each comparison). Jaundice at hospital readmission, however, occurred in 50% of group A but in only 28% of group B ($p<0.01$). Mortality and complication rates were substantially greater in group C than in groups A or B, emphasizing the significance of progressive liver disease in institutionalized patients. Although continued alcoholism was associated with recurrent jaundice, a major impact on other criteria of morbidity was not demonstrated.

4176 LOWER ESOPHAGEAL SPHINCTER FUNCTION IN CIRRHOSIS. (Eng.) Nebel, O. T. (530 Lomas Santa Fe Drive, Solana Beach, CA 92075). *Am. J. Dig. Dis.* 22(12):1101-1105; 1977.

Lower esophageal sphincter (LES) function in cirrhosis was evaluated in 10 cirrhotic patients without ascites, 5 cirrhotic patients with ascites, and 10 controls using an infused manometric system. LES pressure (LESP) in the subjects with cirrhosis (22 + 1 mm Hg) was not significantly ($p>0.05$) different from that of the control subjects (21 ± 1 mm Hg) but was significantly ($p<0.01$) greater than the LESP in the subjects with cirrhosis and ascites (16 ± 2 mm Hg). There was no significant difference in LES response to i.v. pentagastrin, i.v. edrophonium (80 μg/kg), or straight-leg raising in the three groups. After loss of ascitic fluid, LESP significantly ($p<0.01$) increased change in pressure ($\Delta P=9 \pm 3$ mm Hg) and gastric pressure (GP) significantly ($p<0.01$) decreased ($\Delta P=8 \pm 2$ mm Hg). The changes in LESP and GP revealed a significant ($r=0.83$, $p<0.001$) linear correlation. These data indicate that cirrhosis is associated with normal LES function, and that the mechanism of lowered LESP with ascites may be the inability of the LES to maintain a sustained response to chronic increases in GP.

4177 INCIDENCE OF LIVER CIRRHOSIS IN 16 AREAS OF THE U.S. [Abstract]. (Eng.) Garagliano, C. F.; Mendeloff, A. I.; Lilienfeld, A. M. (Dept. Epidemiology, Johns Hopkins Univ., Baltimore, MD). *Gastroenterology* 72(5, Part 2):1060; 1977.

4178 SUBCLINICAL HEPATIC ENCEPHALOPATHY: DETECTION, PREVALENCE, AND RELATIONSHIP TO NITROGEN METABOLISM [Abstract]. (Eng.) Rikkers, L.; Jenko, P.; Rudman, D.; Freides, D. (Emory Univ. Sch. Medicine, Atlanta, GA). *Gastroenterology* 72(5, Part 2):1119; 1977.

4179 DOES PORTAL HYPERTENSION CONTRIBUTE TO THE FEMINIZATION OF ALCOHOLIC MEN [Abstract]? (Eng.) Van Thiel, D. H.; Gavaler, J. S.; Slone, F.; Smith, W. I., Jr.; Lester, R.. (Dept. Medicine, Univ. Pittsburgh, Pittsburgh, PA). *Gastroenterology* 72(5, Part 2):1144; 1977.

See also, 3695, 3844, 3847, 4085, 4087, 4104, 4109, 4110, 4136, 4147, 4149.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

4180 ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY (ERC) IN SURGICAL EMERGENCIES. (Eng.) Safrany, L.; Van Husen, N.; Kautz, G.; Wittrin, G.; Clemens, M.; Weitemeyer, R. (Reinhard-Nieter-Krankenhaus, 2940 Wilhelmshaven, W. Germany). *Ann. Surg.* 187(1):20-23; 1978.

The cases of 12 patients, presenting with an acute abdomen of suspected biliary tract origin, who underwent endoscopic retrograde cholangiography (ERC) are discussed, and 6 cases are presented. Eight patients had either traumatic, spontaneous, or postoperative biliary tract fistulas with five leading to the peritoneal cavity, one to the colon, one to the bronchial tree, and one to the liver parenchyma from a ruptured gallbladder. Each was confirmed by ERC. Four patients with jaundice following traumatic rupture of the liver had a pathological communication between the intrahepatic biliary tracts and the hepatic vascular system. It is concluded that ERC is a reliable method for obtaining precise localization of biliary tract problems in surgical emergencies both pre- and postoperatively.

4181 BILIARY ATRESIA: HISTOPATHOLOGIC OBSERVATIONS AND REFLECTIONS UPON ITS NATURAL HISTORY. (Eng.) Bill, A. H.; Haas, J. E.; Foster, G. L. (Children's Orthopedic Hosp. and Medical Center, 4800 Sand Point Way, Seattle, WA 98105). *J. Pediatr. Surg.* 12(6):977-982; 1977.

To investigate the etiology of biliary atresia, operative liver biopsies and specimens of the extrahepatic ducts and porta hepatis were studied in 12 cases of biliary atresia. In all cases, the liver showed giant cell transformation and inflammation with mononuclear cells and neutrophils. Most had other features of neonatal hepatitis, including hepatocyte necrosis. In the intrahepatic bile ducts of all but one case, in the hepatic ducts and glands at the porta hepatis, and in the extrahepatic ducts where epithelium remained, there was degeneration of the epithelium and intramural inflammation. In the ducts at the porta hepatis and in six of eight extrahepatic ducts where epithelium remained, there was extensive mural fibrosis compromising the diameter of the duct lumens. Three cases showed the inflammatory changes distal to sites of closure of the extrahepatic ducts. These findings demonstrate that hepatitis, intrahepatic cholangitis, and sclerosing cholangitis of the extrahepatic ducts all interact to produce acquired obstruction to bile flow in biliary atresia.

4182 SONOGRAPHIC "PARALLEL CHANNEL" SIGN OF BILIARY TREE ENLARGEMENT IN MILD TO MODERATE OBSTRUCTIVE JAUNDICE. (Eng.) Conran, M. R.; Landay, M. J.; Janes, J. O. (Parkland Memorial Hosp., 5201 Harry Hines Blvd., Dallas, TX 75235). *Am. J. Roentgenol.* 130(2):279-286; 1978.

Minimal dilatations of the biliary system caused by obstruction were diagnosed by recognition of the "parallel channel" signs that are based on the concomitant imaging of the right and left main portal vein branch and the adjacent main hepatic duct. Eighty-six patients with jaundice or an elevation of the bilirubin level of less than 11.0 mg/100 ml were studied prospectively for 10 months. Ultrasound parallel channel signs were best demonstrated on transverse sections in the supine position. Each ultrasound diagnosis of dilated bile ducts was considered a true positive only when confirmed by surgery, percutaneous transhepatic cholangiography, or retrograde endoscopic cannulation. Obstructive jaundice was correctly diagnosed with the parallel channel sign in 27 patients. The lowest bilirubin value at which the sign was positive was 1.5 mg/100 ml. Nonobstructive jaundice was correctly diagnosed in 44 patients. There were three false-negative diagnoses in which the sign was not present despite obstruction and elevated bilirubin. There were no false-positive cases. Five case reports are presented, one of which demonstrated that, without parallel channel sonography, an incorrect diagnosis would have been made. Parallel channel sign is a simple method for the accurate differentiation between obstructive and nonobstructive jaundice when there is mild to moderate elevation of the bilirubin level.

4183 BILIARY PANCREATIC REFLUX DURING PEROPERATIVE RADIOMANOMETRY. (Eng.) Yvergneaux, J. P.; Bauwens, E.; Yvergneaux, E. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8, 9, 1976.* (S. Karger: Basel): 80-85; 1977.

Peroperative transcystic radiomanometries of 100 gallbladder patients with strict, normal, manometry (no hypertony and no hypotony) and 424 patients without jaundice or malignant pathology of the biliary tree who had either normal, hypotonic, or hypertonic manometry were studied to analyze pancreatic reflux (WR). In the gallbladder patients, WR was more frequent in those over 60 yr ($p<0.005$) and increased in incidence with rising perfusion pressure, increasing flow rate, or occurrence of sphincter hypotony. There was a significant increase in the diameter of the duct of Wirsung with increasing age (from 2.2 ± 0.24 mm at <40 yr to 3.3 ± 0.23 mm at >60 yr, $p<0.001$). Only absence or congenital atrophy of the duct of Wirsung excluded WR. WR appears at minimal opening pressure ($p<0.001$) and quickly becomes total when the papillar channel is more developed than the infundibulum of the common bile duct or when the infundibulum of the common duct is undersized compared to the common channel. The most common anatomical channel joined at an acute angle by the two arms of the papilla, forming a "Y" figure, and WR appeared at a pressure higher than minimal. In the patients without jaundice or malignant pathology, WR is rarer in hypertony (37.5%) than in normotony and hypotony (52%, $p<0.025$); it appeared mostly during perfusion or marked hyperpression (72%, $p<0.005$). In residual pancreatitis, WR is short and never total. In benign Oddian stenosis, WR is rarer than normal (32%, $p<0.001$) and short, with a large Wirsungian caliber (4 ± 0.3 mm) that is significantly ($p<0.005$) larger than in patients of the same age with normal manometry. The results show that increased pressure on Wirsung's duct by physiologic (e.g., fatty meal) or pathologic (e.g., benign papillary stenosis) conditions may decrease WR.

4184 CHOLEDOCHODUODENOSTOMY AS AN ADJUNCT TO CHOLEDOCHOLITHOTOMY. (Eng.) Schein, C. J.; Shapiro, N.; Gliedman, M. L. (Albert Einstein Coll. Medicine, New York, NY). *Surg. Gynecol. Obstet.* 146(1):25-32; 1978.

The indications for and results of choledochoduodenostomy in 100 patients operated for calculus related disease of the common bile duct are reported. There were no significant early or late complications of the anastomotic procedure. The 3% mortality was related to antecedent advanced liver disease in two instances and, in one instance, to intra-abdominal sepsis. The surgical bypass had the advantage of circumventing the retained stone problem or the sequelae of benign obstructive disease in the distal part of the choledochus. It permits postoperative roentgenographic and endoscopic evaluation of the anastomotic site. Cholangitis, blind segment disability, and malfunction have not been seen with these indications and this technique. When the common bile duct is at least 1.4 cm wide, primary or secondary choledochoduodenostomy with a wide anastomosis has significant advantages over T-tube intubation in the therapeutic and prophylactic management of choledocholithiasis.

4185 ENDOSCOPIC PAPILLOTOMY. (Eng.) Koch, H.; Rosch, W.; Schaffner, O.; Demling, L. (Medizinische Universitatsklinik, Krankenhausstrasse 12, D-8520 Erlangen, W. Germany). *Gastroenterology* 73(6):1393-1396; 1977.

Experience with endoscopic electrosurgery in the treatment of common bile duct obstruction in 267 patients is reviewed. In 192 of 222 patients with choledocholithiasis, all calculi were evacuated by endoscopic papillotomy (EP). The remaining patients had EP because of papillary stenosis. Complications of EP included nine instances of pancreatitis, seven of bleeding, and two perforations. In 2 of 32 patients having EP for papillary stenosis, stenosis has reappeared on follow-up. The two fatalities were attributable to purulent cholangitis and acute bleeding. This complication rate is less than that reported for the traditional surgical procedures required to manage these situations. The endoscopic method requires less hospitalization and recuperation. EP and stone extraction are the methods of choice for managing common duct obstruction in high risk patients before cholecystectomy, for retained or reformed stones after cholecystectomy, and for papillary stenosis.

4186 ANAEROBES IN HUMAN BILIARY TRACTS. (Eng.) England, D. M.; Rosenblatt, J. E. (Wiesbaden U.S. Air Force Hosp., APO, New York, NY 09330). *J. Clin. Microbiol.* 6(5):494-498; 1977.

Aerobic and anaerobic microorganisms were studied in bile cultures from 371 patients who underwent biliary tract surgery during a 2-yr period. Sixty-nine percent of the cultures were positive, and 41% of these grew anaerobes, although they were present in pure culture only twice. Mixed cultures most commonly contained four different organisms (3 aerobes and 1 anaerobe). *Bacteroides fragilis* was the single most commonly isolated anaerobe and ranked fourth in terms of overall isolates behind *Escherichia coli*, group D streptococci, and *Klebsiella*. *B. fragilis* accounted for 7.0% of the total aerobic and anaerobic isolates and was present in 21% of all positive cultures. *Pseudomonas aeruginosa* and *Clostridium perfringens* ranked fifth and sixth, providing 6.5% and 5.9% of all isolates, resp. This study demonstrates the frequent presence of anaerobes in patients with bactibilia and suggests that these organisms be considered in the formulation of antimicrobial therapy for infections involving human biliary tracts.

4187 ELECTRON PROBE MICROANALYSIS IN THE STUDY OF GALLSTONES. (Eng.) Been, J. M.; Bills, P. M.; Lewis, D. (Dept. Chemical Physics, Univ. Surrey, Guildford, Surrey, England). *Gut* 18 (10):836-842; 1977.

The structure and composition of gallstones were studied using an electron probe microanalyzer in conjunction with other methods. Gallstones were studied layer by layer without greatly disturbing the arrangement of the materials present. Elements, including trace elements such as copper, iron, and manganese, were identified and their distributions mapped. The range of the method was extended to determine the character and distribution of certain chemical groups present by treating sections of gallstone with reagents that contained easily detected elements. The nature of the bonding of the sulfur in the stones was studied by examining the sulfur x-ray spectrum. Pigmented sulfur-containing deposits were found to contain sulfur in a low valence state, but taurine conjugates and the sulfate groups of mucosubstances were not detected. Microcrystalline apatite present in the stones contained some manganese and seemed to be implicated in the adsorption of the low valence sulfur compound and in the nucleation of some stones.

4188 THE REMOVAL OF RETAINED BILIARY TRACT STONES: REPORT OF 105 CASES. (Eng.) Garrow, D. G. (Vancouver General Hosp., Vancouver, British Columbia, Canada). *Br. J. Radiol.* 50(599): 777-782; 1977.

The results of treating 105 cases of retained biliary tract stones are reported. The removal of retained biliary stones was achieved by the use of a steerable catheter and wire basket after T-tube removal. Filling the T-tube tract with contrast after removal of the T-tube made introduction of the catheter much easier and reduced the hazard of tract perforation. Coating the wire Dormia basket with K-Y Jelly or silicone greatly reduced friction between the basket and the lumen of the Burhenne catheter used. In cases where there was doubt about the presence of stones or portions of stones within the duct system after an attempted removal, a urethral catheter was used to keep the tract open, and a cholangiogram was repeated in 48 hr. A total of 115 catheterizations were performed in the 105 patients, with 10% of the patients having more than one catheterization. There were six failures, six complications, and no deaths. Multiple stones were found in 27 patients, and 11 patients had only debris within the duct (no stone actually removed). The complications included rupture of the T-tube tract in two patients, cholangitis in three patients, and a large subhepatic bile collection 3 months after stone removal in one patient.

4189 FEASIBILITY OF LOW-DOSE AND INTERMITTENT CHENODEOXYCHOLIC ACID THERAPY OF GALLSTONES. (Eng.) Marks, J. W.; Bonorris, G. G.; Chung, A.; Coyne, M. J.; Okun, R.; Lachin, J. M.; *et al.* (Cedars-Sinai Medical Center, 8700 Beverly Blvd., Los Angeles, CA 90048). *Am. J. Dig. Dis.* 22(10):856-860; 1977.

The feasibility of low-dose and intermittent chenodeoxycholic acid therapy was assessed in 18 patients with gallstones by studying the induction and persistence of chenodeoxycholic acid-induced biliary lipid changes. Biliary lipid composition with each of three doses of chenodeoxycholic acid was determined in bile samples obtained by cholecystokinin-stimulated duodenal drainage before, after 1 week and 1 month of treatment, and up to 9 weeks after discontinuation of treatment. The lowest dose that significantly reduced the relative concentration of biliary cholesterol was 250 mg/day. A significant reduction occurred 1 week after initiation of treatment ($p<0.05$) and was maintained for 9 weeks following discontinuation of treatment. Thus, clinical trials of low-dose and intermittent chenodeoxycholic acid therapy for gallstone prophylaxis or dissolution are warranted.

4190 PRIMARY COMMON DUCT STONES. (Eng.) Saharia, P. C.; Zuidema, G. D.; Cameron,

J. L. *In: Transactions of the Southern Surgical Association Eighty-Eighth Annual Meeting Held at the Breakers, Palm Beach, Florida, December 6, 7, 8, 1976.* (Philadelphia: J. B. Lippincott Co.): 88: 101-105; 1977.

Clinical presentation, operative findings, surgical treatment, and long term follow-up results are reported in 30 patients with primary common duct stones. Criteria for diagnosis included at least a 2-yr symptom free interval following cholecystectomy; soft, light brown stones or sludge present in the common duct; and the absence of a long cystic duct remnant or a biliary stricture from the previous surgery. The average age of the patients was 66 yr. The interval between cholecystectomy and the diagnosis of primary common duct stones averaged 12 yr. Acute cholangitis was a frequent mode of presentation. At the time of surgery the bile duct was often dilated out of proportion to the serum bilirubin. In only 1 of the 30 patients was ampullary stenosis present. Twenty-six patients had only stone extraction and insertion of a T tube for treatment of their primary common duct stones. Twenty-two of the 26 were followed for an average of 4 yr and 9 months with no evidence of recurrent stones in 18. Four developed recurrent primary common duct stones 1, 5, 5, and 7 yr later. It is concluded that most patients with primary common duct stones do well after stone extraction alone.

4191 INFLUENCE OF CHOLIC AND CHENODEOXYCHOLIC ACID ON BILIARY CHOLESTEROL SECRETION IN MAN. (Eng.) Lindblad, L.; Lundholm, K.; Schersten, T. (Sahlgrenska sjukhuset, S-413 45 Goteborg, Sweden). *Eur. J. Clin. Invest.* 7(5):383-388; 1977.

The interrelationships between biliary bile acid, lecithin, and cholesterol secretion rates were studied during depletion of the bile acid pool and during duodenal administration of cholic or chenodeoxycholic acid in 13 patients 7-12 days after operation for uncomplicated gallstone disease. The mean lecithin secretion rate was significantly higher during cholic acid than during chenodeoxycholic acid infusion (0.45 ± 0.03 versus 0.30 ± 0.03 μmol lecithin/μmol bile acid, $p<0.01$). The relationship between bile acid and cholesterol secretion rates was curvilinear during bile acid pool depletion and during duodenal cholic acid infusion, fitting an equation [$y=x/(a + bx)$] that is the same function found in Michaelis-Menten enzyme kinetics. At low bile acid secretion rates, during bile acid pool depletion and during cholic acid infusion, the lecithin secretion rate was significantly correlated ($r=0.80$, $r=0.70$, and $r=0.86$, resp.) to the cholesterol secretion rate. The bile acid and cholesterol secretion rates were not significantly correlated during chenodeoxycholic acid infusion. However, under this experimental condition, a significant ($r=0.50$) curvilinear relationship between lecithin and cholesterol secretion rates was found. The hepatic bile became unsaturated in cholesterol at significantly lower bile acid secretion rate during mainly chenodeoxycholic acid infusion (10.7 ± 0.3 μmol/min) than during mainly cholic acid infusion (15.6 ± 0.5 μmol/min, $p<0.001$).

4192 ELEVATIONS IN SKIN TISSUE LEVELS OF BILE ACIDS IN HUMAN CHOLESTASIS: RELATION TO SERUM LEVELS AND TO PRURITUS. (Eng.) Ghent, C. N.; Bloomer, J. R.; Klatskin, G. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Gastroenterology* 73(5):1125-1130; 1977.

To define the relationship of bile acid retention to the pruritus of cholestasis, individual bile acids in serum, in acetone swabs of skin, and in skin tissue were quantified in 13 patients with cholestasis undergoing laparotomy and in 8 controls. There was no consistent relationship between pruritus and concentrations of either total or individual bile acids in serum. Skin tissue concentrations of bile acids were elevated in patients with cholestasis, were linearly related to serum levels, and did not differentiate between those patients with and those without pruritus. Concentrations of bile acids on the skin surface, which were lower than those reported by others (2.7 ± 2.0, 4.5 ± 1.0, and 2.1 ± 1.0 μg/750 cm^2 for patients with pruritus and cholestasis, patients with cholestasis alone, and controls, resp.), did not correlate with pruritus and were decreased by simple soap and water washing. These data indicate that the pruritus of cholestasis is not directly related to the skin tissue concentration of any of the major bile acids, although a relationship to a particular molecular form of bile acids could not be excluded.

4193 UNCONJUGATED BILIRUBIN, AND THE HYDROLYSIS OF CONJUGATED BILIRUBIN, IN GALLBLADDER BILE OF PATIENTS WITH CHOLELITHIASIS. (Eng.) Boonyapisit, S. T.; Trotman, B. W.; Ostrow, J. D. (Siriraj Hosp., Mahidol Univ., Bangkok 7, Thailand). *Gastroenterology* 74(1):70-74; 1978.

To assess the role of hydrolysis of conjugated (CB) to unconjugated (UCB) bilirubin in pigment gallstone formation, 52 samples of human gallbladder bile were aspirated at laparotomy. In each bile sample, the concentrations of CB and UCB were determined, using a new thin layer chromatographic method, and the rate of hydrolysis of CB to UCB was measured during incubation at 37 C, performed under nitrogen and in the dark to prevent oxidation of the bile pigments. Nine control biles without gallstones contained no more than 1.87 mg/dl of UCB (<1.2% of total bilirubin), and showed no significant hydrolysis of CB to UCB. Among 24 biles containing cholesterol gallstones, only 3 showed significant hydrolysis of CB, and only 1 of these exhibited increased concentrations of UCB. By contrast, 10 of 19 biles containing pigment precipitates or gallstones revealed increased concentrations of UCB and/or significant hydrolysis of CB to UCB. Biles containing pigment calculi were best distinguished by their supersaturation with the poorly soluble, nonionized form of UCB at the measured bile acid concentration of each sample. Total bilirubin concentrations were not elevated except in four of the five biles containing pigment precipitates. Among 15 biles cultured both aerobically and anaerobically, only 2 grew any bacteria (*Escherichia coli*), and there was no relation between the presence of bacteria and hydrolysis of CB to UCB. It is concluded that some UCB is normally secreted into bile, and that hydrolysis of CB and excessive concentrations of UCB, especially its nonionized form, are associated with pigment gallstones, although related to factors other than bacterial infection.

4194 NON CALCULOUS CHOLECYSTITIS: AN 8 YEAR REVIEW OF CASES TREATED BY ELECTIVE CHOLECYSTECTOMY.

(Eng.) Jones, A. G.; Blair, D. W. (Royal Infirmary, Aberdeen, Scotland). *Scott. Med. J.* 23(1):27-31; 1978.

Thirty-six cases of acalculous cholecystitis (found in a total of 248 cases of cholecystectomy) are reviewed with regard to signs, symptoms, and radiological investigations. The patients had suffered discomfort that lasted from 5 days to 34 yr, and during this time 66 cholecystograms were performed in 32 of these subjects. Persistently negative x-ray examinations were observed in 18 patients, while poor function of the gallbladder was demonstrated in 10. Of 66 gallbladder visualizations, 4 showed stones; 3 of these were false positives, while one showed a common duct stone that was confirmed at operation. Of 42 barium examinations on 25 of the patients, 38 were negative, 2 showed hiatal hernia, 1 showed duodenal diverticula, and 1 showed paraesophageal hiatal hernia plus duodenal diverticula. Gallbladders of all patients with acalculous cholecystitis revealed some abnormalities at surgery. Histological examination showed chronic cholecystitis (7 cases), one being thick-walled with a rupture at the tip and pyogenic granulations. One showed chronic cholesterosis. The remainder showed variable degrees of chronic inflammation. The majority of specimens also had very thickened and, in some cases, fibrosed gallbladder walls. Nineteen patients had some postoperative complications, mainly chest (9) and urinary (8) tract infections, wound infection (6), and pneumonia (4). One 80-yr-old patient died of a pulmonary embolus. The majority of the patients (29) were symptomless within 2 months after surgery; in two other cases, symptoms disappeared in 5 and 12 months, resp. Four subjects had postoperative symptoms related to the pre-operative ones, and one had new symptoms. Patients with recurrent attacks of cholecystitis should be considered for cholecystectomy despite repeatedly negative radiological examinations.

4195 DIAGNOSIS AND MANAGEMENT OF POST-CHOLECYSTECTOMY SYMPTOMS: THE PLACE OF ENDOSCOPY AND RETROGRADE CHOLEDOCHOPANCREATOGRAPHY.

(Eng.) Blumgart, L. H.; Carachi, R.; Imrie, C. W.; Benjamin, I. S.; Duncan, J. G. (Glasgow Royal Infirmary, Glasgow, Scotland). *Br. J. Surg.* 64(11): 809-816; 1977.

The value of endoscopic retrograde choledochopancreatography (ERCP) in the diagnosis and management of postcholecystectomy symptoms was assessed in 52 patients symptomatic after cholecystectomy in whom barium meal studies and i.v. cholangiography had failed to yield a diagnosis. Cannulation of the papilla of Vater was carried out in 50 of the patients in a mean time of 10 min. Diagnostic information demonstrating a pathological lesion or a normal biliary and pancreatic ductal system was obtained by endoscopy and ERCP in 48 cases. There were no serious complications. A pathological lesion was demonstrated in all but one of the patients presenting with jaundice, cholangitis, or pancreatitis, but the diagnostic yield was not as high in patients with vague upper abdominal symptoms. Endoscopy and ERCP are the investigative procedures of choice in complex postcholecystectomy patients in whom i.v. cholangiography either fails, gives incomplete information, or is false-negative despite continuing symptoms or clinical evidence of residual biliary disease.

4196 MULTIPLE GALLBLADDERS.

(Eng.) Harlaftis, N.; Gray, S. W.; Skandalakis, J. E. (Emory Univ. Sch. Medicine, Atlanta, GA). *Surg. Gynecol. Obstet.* 745(6):928-934; 1977.

Two hundred seven reports in the literature of double gallbladder and eight of triple gallbladder are reviewed. Multiple gallbladders form a continuous spectrum of malformation, from an externally normal gallbladder with an internal longitudinal septum to the most widely separated accessory gallbladders. Although multiple gallbladders are found more frequently in women than in men, the authors believe that the duplication occurs about equally in men and women and that the difference is in the frequency of gallbladder disease and hence in the frequency of discovery of the anomaly. When disease is present, both organs are usually affected if they are intimately connected. When separation is complete and each organ has its own cystic duct, it is not unusual to find one healthy and one diseased gallbladder. Cholecystography remains the best means for preoperative diagnosis of multiple gallbladders, but it is most effective with healthy gallbladders. In about 69% of surgically confirmed instances of duplication, the preoperative cholecystogram failed to reveal the duplication. Hence, abnormal films are diagnostic, and normal films do not rule out duplication. Operative cholangiography should be used in all doubtful instances. Symptomatic multiple gallbladders require cholecystectomy. All cystic structures should be removed. In elderly or debilitated patients, cholecystostomy should be considered. Multiple gallbladders without symptoms should be left alone.

4197 JAUNDICE AND HEPATITIS B SURFACE ANTIGEN AND ANTIBODY IN GREEK HAEMOPHILIACS.

(Eng.) Yannitsiotis, A.; Bossinakou, I.; Louizou, K.; Panayotopoulou, C.; Mandalaki, T. (51 Homirou str., Athens, 135, Greece). *Scand. J. Haematol.* (Suppl. 30):11-15; 1977.

The incidence of hepatitis B surface antigen (HBsAg) and antibody (HBsAb), and of abnormal liver function, in 101 Greek multitransfused hemophiliacs with or without a previous history of jaundice was studied. Using the hemagglutination inhibition assay, HBsAg was detected in 9.9%, HBsAb in 61.3%, and HBsAg plus HBsAb in 11.8% of the patients. The incidence of jaundice was 14.8%. Liver function was tested by means of Normotest, SGOT, SGPT, and serum protein electrophoresis; abnormal values were found in 47% of the patients. The abnormal findings were related to the presence of HBsAg or HBsAb and to the history of jaundice. There was no significant difference between the various groups of patients.

4198 BILIARY BACTERIA AND HEPATIC HISTOPATHOLOGIC CHANGES IN GALLSTONE DISEASE. (Eng.)

Flinn, W. R.; Olson, D. F.; Oyasu, R.; Beal, J. M. *In: Transactions of the Southern Surgical Association Eighty-Eighth Annual Meeting held at the Breakers, Palm Beach, Florida, December 6, 7, 8, 1976.* (Philadelphia: J. B. Lippincott): 88:101-105; 1977.

The frequency and severity of liver damage in 126 patients with gallstone disease and the role of bacteria in the development of these changes were assessed. Needle biopsy of the liver demonstrated acute inflammation of portal triads in 19 of the patients with gallstones, a finding not present in the 26 control patients. Acute inflammation occurred more often in patients with acute cholecystitis and choledocholithiasis than in chronic cholecystitis. Cultures of the biliary tract or liver were positive in 23 of 64 patients. The frequency of positive bile cultures increased with the severity of the biliary tract disease. Five of six positive liver cultures were from patients with acute cholecystitis or choledocholithiasis. The data suggest that impairment of bile flow is responsible for the acute hepatic inflammatory changes.

4199 CHOLELITHIASIS AND WILSON DISEASE. (Eng.)

Rosenfield, N.; Grand, R. J.; Watkins, J. B.; Ballantine, T. V. N.; Levey, R. H. (Harvard Medical Sch., Boston, MA). *J. Pediatr.* 92(2):210-213; 1978.

Clinical data is presented on three children with Wilson's disease who had symptoms suggestive of cholecystitis as well as radiologic evidence of gallstones, which were subsequently proven at the time of laparotomy. The gallstones from the patients with Wilson's disease had an appreciably higher content of cholesterol than gallstones from age-matched children with hemolytic disease. Since gallstones may be present for years before they produce clinical symptoms, young patients with Wilson's disease should undergo routine investigation for the presence of stones; cholelithiasis should also be considered in the differential diagnosis of abdominal pain in such patients.

4200 SPHINCTEROTOMY OF ODDI'S SPHINCTER. (Eng.)

Mentouri, B. *In: The Sphincter of Oddi. Proceedings of the Third Gastroenterological Symposium, Nice, June 8, 9, 1976.* (S. Karger: Basel): 190-195; 1977.

To study the effectiveness of sphincterotomy of Oddi's sphincter as a treatment for lithiasis of the common bile duct (CBD), 483 sphincterotomies performed between 1963 and 1975 were studied. The sphincterotomies were indicated for reasons of necessity in 302 cases (impacted stone in 84, removal by upper route impossible in 130, odditis in 73, and pancreatitis plus impacted stone in 15) and for reasons of security (where the aim is to carry out internal drainage of the CBD) in 176 cases (multiple stones in 61, biliary deposit and cholangitis in 30, lithiasis with one stone in 72, and residual lithiasis in 13); in 5 cases, sphincterotomy was abusive, due to erroneous interpretation of the x-ray picture of the lower CBD. Morbidity concerning sphincterotomy occurred in 34 cases (postoperative pancreatitis, 14; duodenal fistula, 5; subphrenic abscess, 7; cholangitis, 3; hemorrhage, 5) and in 11 cases not connected with sphincterotomy for an overall morbidity rate of 9.2%. There were 21 deaths connected with sphincterotomy, due to acute postoperative pancreatitis (12), subphrenic abscesses (4), duodenal fistulas (2), cholangitis (2), and hemorrhage of sphincterotomy (1). Long-term results in 234 patients were excellent in 163, good in 27, fair in 41, and poor in 3. The study suggests that sphincterotomy is a satisfactory technique, especially with respect to the very few cases of retained stone (1/234). However, postoperative mortality due to pancreatic complications (55% of deaths) suggests that indications for sphincterotomy should be applied in a more eclectic manner.

4201 BENIGN STENOSIS OF THE PAPILLA OF VATER: DIAGNOSIS OF 119 CASES WITH CONVENTIONAL AND SELECTIVE LOW RADIOMANOMETRY. (Eng.)

Yvergneaux, J. P.; Bauwens, E.; Outryve, L. V.; Yvergneaux, E. (President Rooseveltlaan 92, B-9000 Ghent, Belgium). *Acta Chir. Belg.* 76(6):523-532; 1977.

Experience with intraoperative radiomanometry with serial conventional films (panoramic cholangiography) and intra-abdominally placed large dental films (selective low cholangiography) in 2,095 patients with benign biliary pathology is presented. These techniques revealed 119 cases of stenosis of the papilla of which 34 were detected during secondary operations on 85 patients. With this procedure, a clear definition of benign stenosis of the papilla was obtained. The features included: moderate hypertony, disappearance of the normal rhythmical sphincter activity, widening of the biliary infundibulum so that it was wider than the intrapancreatic part of the common bile duct above it, rarity of biliary pancreatic reflux, and enlargement of the pancreatic duct. These signs are characteristic of chronic stasis in both the common bile duct and the pancreatic duct, from the infundibulum to the intrahepatic ducts above the stenotic papilla.

4202 FUNCTION DISORDERS OF THE LIVER, EXTRAHEPATIC BILE DUCTS AND SOME ORGANS OF THE GASTROINTESTINAL TRACT IN ACUTE CHOLECYSTITIS. (Rus.) Shevchenko, V. S. (Dept. Hosp. Surgery, Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (2):20-25; 1977.

4203 CLINICAL ASPECTS OF ACUTE CHOLECYSTITIS IN ELDERLY PATIENTS. (Rus.) Safronov, A. V. (Clinic General Surgery, Saratov Medical Inst., Saratov, USSR). *Klin. Khir.* (2):26-29; 1977.

4204 ADRENAL CORTEX FUNCTION IN ACUTE CALCULOUS CHOLECYSTITIS IN ELDERLY PERSONS. (Rus.) Ashrafov, A. A. (First Dept. Surgery, N. Narimanov Azerbaidzhan Medical Inst., USSR). *Klin. Khir.* (2): 29-34; 1977.

4205 BRAN, A NEW THERAPEUTIC AGENT. (CONSTIPATION, BILIARY LITHIASIS, DIVERTICULOSIS AND CANCER OF THE COLON). (Fre.) Bargheon, J. (No affiliation given). *Rev. Fr. Gastroenterol.* (126):5-10; 1977.

4206 TREATMENT OF BILIARY LITHIASIS WITH CHENODEOXYCHOLIC ACID. (Fre.) Petite, J. P. (Hopital Broussais, 96, rue Didot, 75674 Paris Cedex 14, France). *Rev. Prat.* 27(12):757-759; 1977.

4207 TREATMENT OF PATIENTS WITH CHOLESTEROL GALLSTONES WITH CHENODEOXYCHOLIC ACID. (Fre.) Guimezanes, A. (Faculte de Medecine Broussais-Hotel-Dieu, France). *Rev. Fr. Gastroenterol.* (126): 49-52; 1977.

4208 POSSIBILITY OF DISSOLVING GALLSTONES USING CHENODEOXYCHOLIC ACID. (Pol.) Bojanowicz, K.; Witkowska, A. (Klinika Gastroenterologiczna, Instytut Medycyny Wewnetrznej AM, ul. Rewolucji 1905 r. 76 m. 1., 90-223 Lodz, Poland). *Pol. Tyg. Lek.* 32(33):1299-1302; 1977.

4209 CALCIUM PALMITATE AND CHOLESTEROL GALLSTONES. (Ger.) Wosiewitz, U.; Wolpers, C. (Univ. Munster, Institut fur Medizinische Physik, Huflerstrasse 68, D-4400 Munster, W. Germany). *Z. Gastroenterol.* 15(5):311-319; 1977.

4210 CONSEQUENCES OF "IDEAL" CHOLECYSTOTOMY WITH CHOLECYSTOJEJUNOSTOMY IN CHOLELITHIASIS. (Rus.) Lys, P. V. (Second Dept. Surgery, Kiev Inst. Advanced Medical Studies, Kiev, USSR). *Klin. Khir.* (2):85-86; 1977.

4211 SPHINCTEROTOMY FOR CHOLEDOCHOLITHIASIS [Letter to Editor]. (Fre.) Bancaud, E. (17, place des Epars, F 28000 Chartres, France). *Nouv. Presse Med.* 6(16):1396; 1977.

4212 CHOLELITHIASIS. (Rus.) Vinogradov, V. V.; Khodzhaeva, M. Kh. (Dept. Surgery, Patrice Lumumba Peoples' Friendship Univ., Moscow, USSR). *Sov. Med.* (2):51-55; 1977.

4213 COMPLICATIONS OF CHOLELITHIASIS. (Ger.) Reismann, B.; Bayer, H. W. (II. Ordinariat fur Chirurgie der Universitat, Ostmerheimer Strasse 200, 5000 Koln 91, W. Germany). *Med. Welt* 28(7):315-320; 1977.

4214 BILE STORAGE AND DISCHARGE IN PATIENTS WITH CHOLELITHIASIS AND IN NORMAL CONTROLS [Abstract]. (Dut.) van Berge Henegouwen, G. P.; Hofmann, A. F. (No affiliation given). *Ned. Tijdschr. Geneeskd.* 121(28):1155; 1977.

4215 CHOLELITHIASIS IN SITUS INVERSUS PARTIALIS ABDOMINALIS. (Ger.) Bohm, S.; Werner, G.; Voigtsberger, P. (Chirurgische Klinik der Medizinischen Akademie, Nordhauser Strasse 74, DDR-50 Erfurt, E. Germany). *Zentralbl. Chir.* 102(14):883-885; 1977.

4216 IATROGENIC GALLSTONE. (Dut.) Standaert, L. (No affiliation given). *Tijdschr. Gastroenterol.* 20(2):113-123; 1977.

4217 HOMOZYGOUS DREPANOCYTOSIS AND CHOLELITHIASIS. (Fre.) Buffet, C.; Missonier, G.; Labayle, D.; Edouard, A.; Etienne, J. P. (Hopital Antoine Beclere, 157, rue de la Porte de Trivaux, F 92141 Clamart, France). *Ann. Med. Interne* 128(3): 281-284; 1977.

4218 BACTERIOLOGICAL STUDY OF BILE IN LITHIASIS: REPORT OF 177 CASES. (Fre.) Grimoud, M.; Izard, G.; Lazorthes, F.; Lemozy, J. (Hopital de Purpan, Place du Docteur Baylac, 31052 Toulouse Cedex, France). *Rev. Fr. Gastroenterol.* (128):47-50; 1977.

4219 HEPATIC HYDATID CYSTS PERFORATING IN THE BILIARY TRACT. (Rus.) Dedenko, I. K. (No affiliation given). *Vestn. Khir.* 118(3):38-40; 1977.

4220 CLINICAL ASPECTS OF EXTERNAL BILIARY FISTULAS. (Rus.) Chalganov, A. I. (No affiliation given). *Khirurgiia (Mosk.)* (3):107-111; 1977.

4221 EXPERIENCE FROM SURGICAL INTERVENTIONS PERFORMED FOR JAUNDICE. (Hun.) Zolnay, B.; Bodrogi, N.; Bende, S. (Semmelweis Korhaz, Sebeszet, Miskolc, Hungary). *Orv. Hetil.* 118(29): 1715-1720; 1977.

4222 THREE PATIENTS WITH "PAINLESS JAUNDICE." (Dut.) de Gruijl, J. (Medische Faculteit der Erasmus Universiteit, Rotterdam, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(28):1121-1123; 1977.

4223 CHOLESTATIC JAUNDICE: ETIOLOGICAL DIAGNOSIS BY MINILAPAROTOMY [Letter to Editor]. (Fre.) Laurent, J.; Vicari, F.; Jeanpierre, R. E. (G. R. P. D. N., 127, rue St-Dizier, F 54000 Nancy, France). *Nouv. Presse Med.* 6(9):751; 1977.

4224 SIGNIFICANCE OF DETERMINATION OF PANCREATOPEPTIDASE AND HEXOKINASE IN THE BLOOD SERUM IN MECHANICAL JAUNDICE. (Rus.) Podilchak, L. M. (Propedeutic Dept. Internal Diseases, Lvov Medical Inst., Lvov, USSR). *Ter. Arkh.* 49(2):64-66; 1977.

4225 EXPERIENCE IN TREATMENT OF MECHANICAL JAUNDICE. (Rus.) Lys, P. V.; Paratsiy, Z. Z.; Oberemko, B. I. (Second Dept. Surgery, Kiev Inst. Advanced Medical Studies, Kiev, USSR). *Vrach. Delo* (5):32-36; 1977.

4226 PROGNOSTICATION OF POSTOPERATIVE HEPATIC INSUFFICIENCY IN PATIENTS WITH MECHANICAL JAUNDICE. (Rus.) Trofimov, V. M. (S. P. Fedorov Surgical Clinic, S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 118(3):27-31; 1977.

4227 DISTURBED HEMOSTASIS IN MECHANICAL JAUNDICE. (Rus.) Pavlovsky, D. P. (Kiev Oblast Clinical Hosp., Kiev, USSR). *Klin. Med.* 55 (4):74-77; 1977.

4228 PAPILLOMATOSIS OF THE HEPATIC BILE DUCTS: REPORT OF TWO CASES. (Fre.) Chigot, J. P.; Gory, P.; Riquet, M.; Mercadier, M. (No affiliation given). *Rev. Fr. Gastroenterol.* (126):23-25; 1977.

4229 STENOSIS, INSUFFICIENCY AND STENOTIC INSUFFICIENCY OF THE SPHINCTER OF ODDI. (Ita.) Berti Riboli, E.; Mortola, G. P.; Reboa, G.; Pandolfo, N.; De Salvo, L. (Istituto di Clinica Chirurgica Generale e Terapie Chirurgica [B], Univ. Genova, Genova, Italy). *Minerva Gastroenterol.* 23(1):31-34; 1977.

4230 SURGICAL MANAGEMENT OF BILE DUCT STENOSIS BY HEPATICOJEJUNOSTOMY. (Ger.) Simma, W.; Brucke, P. (Allgemeinen Krankenhauses der Stadt Linz, Krankenhausstrasse 9, A-4020 Linz, Austria). *Wien. Med. Wochenschr.* 127(12):403-405; 1977.

See also, 3654, 3667, 3669, 3742, 3844, 3847, 3848, 3854, 3855, 3858, 3875, 3877, 3886, 3895, 3898, 3899, 3900, 3939, 4084, 4170, 4231.

GENERAL

4231 EFFECTS OF INTERMITTENT AND CONTINUOUS FEEDING ON BILIARY LIPID SECRETION IN MAN. (Eng.) von Bergmann, K.; Mok, H. Y. I.; Grundy, S. M. *In: Bile Acid Metabolism in Health and Disease. Proceedings of the IV Bile Acid Meeting, Basel, Switzerland, 11-12 October, 1976.* (Baltimore, Md.: University Park Press): 191-196; 1977.

The effects of continuous versus intermittent feeding was compared by measuring hourly outputs of biliary lipids in 9 patients and by determining bile acid and cholesterol absorption in 23 and 28 patients, resp. The determinations were made in both obese and nonobese patients, in some with mild hyperlipidemia, and in three with alcoholic cirrhosis. Biliary lipid output, measured in mg/hr, was very similar for continuous and intermittent feeding (cholesterol, 46 and 48, resp.; bile acids, 769 and 794, resp.; phospholipids, 308 and 304, resp.). Total bile acid absorption by the intestine in all subjects was 97.5%. There were no significant differences among the various types of patients. Cholesterol absorption was 60%, with no significant differences for the different groups. These findings indicate that similar results are obtained for average hourly secretion rates of biliary lipids whether the diet is given continuously into the duodenum or is fed p.o. as three meals a day. Thus, studies carried out by the two methods should be comparable, provided other aspects in the methodology of intestinal perfusion are similar.

4232 HEPATIC BILIRUBIN UDP-GLUCURONYLTRANSFERASE IN PATIENTS WITH SICKLE CELL ANEMIA. (Eng.) Maddrey, W. C.; Cukier, J. O.; Maglalang, A. C.; Boitnott, J. K.; Odell, G. B. (Johns Hopkins Hosp., 601 N. Broadway, Baltimore, MD 21205). *Gastroenterology* 74(2, Part 1):193-195; 1978.

To determine the effects of the excessive bilirubin load in sickle cell anemia on the microsomal conjugating enzyme, hepatic bilirubin uridine diphosphate (UDP) glucuronyltransferase, levels of this enzyme were measured in liver biopsies from 14 patients with sickle cell anemia and 14 control patients with modest elevations in the levels of serum transaminases or alkaline phosphatase, 10 controls who were chronic drug users, 6 patients with Gilbert's syndrome, and 2 patients with hereditary spherocytosis. UDP-glucuronyltransferase activity in the patients with sickle cell anemia was twofold greater ($p<0.005$) than in the 14 nonjaundiced control patients. The elevated UDP-glucuronyltransferase activity in sickle cell anemia was similar to that found in the 10 patients who chronically ingested drugs (barbiturates or estrogens) known to increase UDP-glucuronyltransferase activity. These observations suggest that enhanced conjugation of bilirubin in patients with sickle cell anemia may result from substrate (bilirubin) induction of UDP-glucuronyltransferase.

4233 DAILY URINARY CATECHOLAMINE PROFILE IN MARASMUS AND KWASHIORKOR. (Eng.) Ramirez, A.; Fletes, L.; Mizrahi, L.; Parra, A. (Centro Medico Nacional, Instituto Mexicano del Seguro Social, Mexico City, Mexico). *Am. J. Clin. Nutr.* 31(1):41-45; 1978.

Studies were carried out to determine the daily urinary excretion of catecholamines in normal weight children and in children with protein-calorie malnutrition, as part of a comprehensive study to evaluate the relationships between altered energy metabolism and the hormonal adaptations present in these conditions. In eight normal weight infants (mean age 7.3 months) with gram-positive gastrointestinal or pulmonary infections, 24-hr urine collections were performed on two consecutive days, and triplicate determinations of total catecholamines, dopamine, norepinephrine, epinephrine, and vanilmandelic acid were performed on each urine sample. These results were compared to those obtained in 4 severely marasmic infants (mean age 4.5 months) with moderate hypovolemic shock, 10 severely marasmic infants (mean age 6.4 months) without shock, and 6 children with acute kwashiorkor (mean age 20.6 months). All patients had the same type of infection as the normal weight infants. The day-to-day variability in urinary catecholamine excretion was not significant in any of the groups studied. Marasmic infants and children with kwashiorkor excreted similar amounts of total catecholamines as normal weight infants. However, marasmic and normal weight infants excreted proportionally three to four times less epinephrine than norepinephrine. Children with kwashiorkor excreted similar amounts of the two hormones (epinephrine:norepinephrine ratio=0.88). These findings suggest that in marasmus and kwashiorkor, norepinephrine and epinephrine, resp., are involved in the regulation of the metabolic adaptations to these diseases.

4234 PANCREATIC VEIN CATHETERIZATION WITH GASTRIN ASSAY IN NORMAL PATIENTS AND IN PATIENTS WITH THE ZOLLINGER-ELLISON SYNDROME. (Eng.) Ingemansson, S.; Larsson, L. I.; Lunderquist, A.; Stadil, F. (Dept. Surgery, Univ. Lund, 5-221 85 Lund, Sweden). *Am. J. Surg.* 134(5): 558-563; 1977.

Simultaneous catheterization of the aorta and the caval, portal, and pancreatic veins with blood sampling for gastrin radioimmunoassay was performed in three patients with the Zollinger-Ellison (ZE) syndrome and in five control patients without peptic ulcer disease to determine whether these procedures could be carried out in the patients with the ZE syndrome before and after tumor extirpation and total gastrectomy. In addition, the use of high pancreatic arteriovenous gastrin differences for the localization of gastrin-producing tumors was investigated. In the controls, the gastrin concentrations in the pancreatic veins ranged from 15 to 148 pg/ml (mean, 65; median, 67). Pre- and postoperative catheterizations were performed in two of the ZE patients, and very high gastrin concentrations in several pancreatic veins indicated the occurrence of multiple tumors, whereas angiography revealed only one tumor in one of the patients. Twelve months after extirpation of the tumors and total gastrectomy, gastrin concentrations in peripheral as well as pancreatic venous blood were lower ($p<0.001$) but still pathologically high. The third patient was catheterized 2 and 12 months after tumor extirpation and total gastrectomy; the gastrin values were within the range of the reference group (<100 pg/ml) except for one pancreatic vein with slightly increased concentrations. The gastrin concentration did not increase in the interval between the two catheterizations. No complications were noted. The triple catheterization technique with blood sampling for hormone assay is advocated as a diagnostic tool and as a localization procedure in patients with suspected or proved ZE syndrome.

4235 BILE ACID DIARRHEA. (Dut.) Jansen, W.; Rijken, J. (Afdeling Gastro-enterologie van de kliniek voor Inwendige Ziekten, Academisch Ziekenhuis te Groningen, Groningen, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(29):1174-1179; 1977.

4236 GEOGRAPHIC DISTRIBUTION OF GASTROINTESTINAL CANCER IN BELGIUM. UNEQUAL DISTRIBUTION OF THE MORTALITY RATES BY CANCERS OF THE STOMACH AND OF THE RECTUM. (Fre.) Ramioul, L.; Tuyns, A. J. (Ecole de Sante Publique, Universite Libre de Bruxelles, Brussels, Belgium). *Acta Gastroenterol. Belg.* 40(3/4):129-147; 1977.

4237 ROLE OF GUT BACTERIAL FLORA IN NUTRITION AND HEALTH: A REVIEW OF RECENT ADVANCES IN BACTERIOLOGICAL TECHNIQUES, METABOLISM, AND FACTORS AFFECTING FLORA COMPOSITION. (Eng.) Brown, J. P. (Dept. Biological Sciences, Dynapol, Palo Alto, CA). *CRC Crit. Rev. Food Sci. Nutr.* 8(3): 229-336; 1977.

4238 PHAGOCYTE DYSFUNCTION IN COMMON VARIABLE IMMUNE DEFICIENCY. (Eng.) Seger, R.;

Wildfeuer, A.; Auer, I. O.; Jeschke, R.; Catty, D.; Drew, R.; *et al.* (Universitats-Kinderklinik Josef-Schneider Str. 2, D-8700 Wurzburg, W. Germany). *Klin. Wochenschr.* 55(15):735-742; 1977.

4239 ABUSE OF LAXATIVES. (Dut.) Klinkenberg-Knol, E. C.; Tytgat, G. N.; Rutgeers, L. (Wilhelmina Gasthuis, Amsterdam, Netherlands). *Ned. Tijdschr. Genesskd.* 121(29):1166-1170; 1977.

4240 STUDY OF THE CURATIVE VALUE OF A NEW INTESTINAL ANTISEPTIC IN ALL CASES OF DIARRHEA. (Fre.) Dornier, R. (Groupe de Gastroenterologie, 127, rue Saint-Dizier, 54000 Nancy, France). *Ann. Gastroenterol. Hepatol.* 13(3):283-286; 1977.

4241 PHOSPHATASE ACTIVITY IN PATIENTS WITH DIFFERENT FORMS OF TYPHOID INFECTION. (Rus.) Bilibin, A. F.; Pogorelskaya, L. V.; Isaeva, N. P.; Morozova, M. M.; Lashin, V. Ya. (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (5):41-43; 1977.

4242 PATHOGENESIS OF FUNCTIONAL INTESTINAL DISORDERS IN PATIENTS WITH ACUTE DYSENTERY. (Rus.) Bunin, K. V.; Fedorov, N. A.; Rybov, V. I.; Malykhina, L. S.; Mescheryakov, V. G. (No affiliation given). *Sov. Med.* (5):44-47; 1977.

4243 CATAMNESIS IN DYSENTERY PATIENTS. (Rus.) Abubakirov, V. T.; Shalygina, N. B.; Jushchuk, N. D. (Central Scientific Res. Inst. Epidemiology, Ministry Health USSR, Moscow, USSR). *Sov. Med.* (5):47-51; 1977.

4244 MATHEMATICAL METHODS IN THE DIFFERENTIAL DIAGNOSIS OF THE GASTROINTESTINAL FORM OF SALMONELLOSIS AND ACUTE DYSTENTERY. (Rus.) Pokrovsky, V. I.; Mashilov, V. P.; Yushchuk, N. D. (Central Scientific Res. Inst. Epidemiology, Ministry Health USSR, Moscow, USSR). *Sov. Med.* (5):51-54; 1977.

4245 STRUCTURE-FUNCTIONAL ANALYSIS OF THE PATHOLOGICAL PROCESS IN THE STOMACH OF DYSENTERIC PATIENTS. (Rus.) Blyuger, A. F.; Terentieva, L. A.; Sumlyaninova, N. P. (Riga Medical Inst., Riga, USSR). *Sov. Med.* (5):54-60; 1977.

4246 TREATMENT OF THE ZOLLINGER-ELLISON SYNDROME. (Rus.) Zhuravskii, L. S.; Syrbu, I. F.; Chasovskikh, V. M.; Volkov, V. P. (Kalinin Medical Inst., Kalinin, USSR). *Khirurgiia (Mosk.)* (8):6-9; 1977.

4247 RARE SOURCES OF GASTROINTESTINAL HEMORRHAGE. (Rus.) Geshelin, S. A. (Odessa Medical Inst., Odessa, USSR). *Khirurgiia (Mosk.)* (8):12-17; 1977.

4248 QUANTITATIVE CHARACTERISTICS OF IMMUNOCOMPETENT CELLS OF THE LARGE INTESTINE MUCOSA IN ACUTE DYSENTERY. (Rus.) Sinelnikova, M. P.; Novikova, A. V.; Danilova, E. A. (Moscow Scientific Res. Inst. Epidemiology and Microbiology, Ministry Health USSR, Moscow, USSR). *Arkh. Patol.* 39(6):13-18; 1977.

4249 DYNAMIC CHANGES IN THE LYSOZYME CONCENTRATION IN THE BLOOD SERUM OF PATIENTS WITH TYPHOID FEVER TREATED WITH LEVOMYCETIN IN CONJUNCTION WITH PREDNISOLONE AND BUTADION. (Rus.) Martynov, S. V.; Breeva, L. G.; Roenko, N. F. (Ryazan Medical Inst., Ryazan, USSR). *Sov. Med.* (6):127-128; 1977.

4250 WATER AND ELECTROLYTE DISORDERS IN APUDOCARCINOMAS. (Fre.) Grisoli, J.; Nicolino, J.; Serment, G.; Faure, X.; Rampal, P.; Delmont, J. (Hopital de la Conception, 144, rue St. Pierre, F 13385 Marseille Cedex 4, France). *Ann. Endocrinol. (Paris)* 38(2):149-150; 1977.

4251 COMPARATIVE EVALUATION OF COTRIMOXAZOLE AND CHLORAMPHENICOL IN THE TREATMENT OF TYPHOID-PARATYPHOID INFECTIONS: CLINICAL AND BACTERIOLOGICAL STUDY OF 300 CASES. (Ita.) Pastore, G.; Chelotti, P.; Pesce, V.; Schiraldi, G. (Via G. Toma, 34 Bari, Italy). *Clin. Ter.* 81(4):309-324; 1977.

4252 LONG-TERM RESULTS OF RADIATION AND COMBINED TREATMENT OF CYLINDROMA OF THE SALIVARY GLANDS. (Rus.) Brodskaya, N. Ya. (N. A. Semashko Medical Stomatology Inst., Moscow, USSR). *Med. Radiol. (Mosk.)* 22(8):3-7; 1977.

4253 HOMEOSTATIC DISORDERS AND THEIR TREATMENT IN PATIENTS WITH GASTROGENIC TETANY. (Rus.) Spynu, A. V. (Kishinev Medical Inst., Kishinev, USSR). *Vestn. Khir.* 119(8):59-61; 1977.

4254 PATHOGENESIS OF CARDIOVASCULAR DISORDERS IN PATIENTS WITH DYSENTERY. (Rus.) Bychkovsky, V. N.; Vikhreva, E. A.; Bogadelnikov, I. V. (Crimean Medical Inst., Simferopol, USSR). *Vrach. Delo* (6):138-141; 1977.

4255 CLINICAL AND IMMUNODIAGNOSTIC CHARACTERISTICS OF MODERN TYPHUS ABDOMINALIS. (Rus.) Rostapshov, M. F.; Tovstiuk, V. N.; Ushenina, N. S. (Zaporozhye Medical Inst., Zaporozhye, USSR). *Vrach. Delo* (6):135-138; 1977.

4256 LISTERIOSIS IN THE NEWBORN: REPORT OF 53 CASES. (Fre.) Relier, J. P.; Amiel-Tison, C.; Krauel, J.; Helffer, L.; Larroche, J. C.; Minkowski, A. (Hopital Port-Royal, 123, Bd de Port-Royal, F 75014 Paris, France). *J. Gynecol. Obstet. Biol. Reprod. (Paris)* 6(3):367-381; 1977.

4257 ABDOMINAL TUBERCULOSIS IN CHILDHOOD. (Fre.) Hambourg, M.; Harouchi, A.; Revillon, Y.; Nihoul-Fekete, C.; Pellerin, D. (Hopital des Enfants-Malades, 149, rue de Sevres, 75015 Paris, France). *Ann. Chir. Infant. Paris* 18(4):291-298; 1977.

4258 COMPARISON BETWEEN FGPR AND ONE OF ITS COMMERCIAL ASSOCIATIONS WITH ADSORBING SUBSTANCES, FRUCTOSE, AND MINERAL SALTS IN THE TREATMENT OF ACUTE ENTERITIS IN NURSELINGS. (Ita.) Benatti, C.; Galavotti, E. (Sassuolo Hosp., Sassuolo [Modena], Italy). *Minerva Pediatr.* 29(24):1541-1548; 1977.

4259 GASTROINTESTINAL TRACT SARCOMA. (Ger.) Witting, C.; Strunk, E.; Niedorf, H. R. (Pathologisches Institut, Westring 17, D-4400 Munster/Westfalen, W. Germany). *Chirurg* 48(5): 48(5):319-324; 1977.

4260 ACTINIC LESIONS OF THE INTESTINE: STUDY OF 40 CASES. (Fre.) Marti, M. C.; Garcia, J.; Turculet, V. (Hopital Cantonal Universitaire, CH-1211 Geneve 4, Switzerland). *Schweiz. Med. Wochenschr.* 107(15):537-539; 1977.

4261 A NEW APPARATUS FOR DESINFECTION [sic] OF FIBERENDOSCOPES [Abstract]. (Eng.) Baas, E. U. (I. Dept. Medicine, Univ. Mainz, D 6500 Mainz, W. Germany). *Gastroenterology* 72(5, Part 2):1026; 1977.

4262 INTESTINAL MUCOSAL ENZYMES IN THE DIAGNOSIS OF GASTROINTESTINAL METABOLIC DISEASE. (Eng.) Garnica, A. D. (Univ. Florida Coll. Medicine, Gainesville, FL 32610). *Ann. Clin. Lab. Sci.* 7(3):241-250; 1977.

4263 'HEMOCCULT'$^{\text{TM}}$ TEST--REVERSAL OF FALSE-NEGATIVE RESULTS DUE TO STORAGE [Abstract]. (Eng.) Wells, H. J.; Pagano, J. F. (Smith Kline Diagnostics, Philadelphia, PA 19101). *Gastroenterology* 72(5, Part 2):1148; 1977.

4264 MAJOR INTESTINAL COMPLICATIONS OF RADIOTHERAPY [Abstract]. (Eng.) Deitel, M.; Alexander, M. A. (St. Joseph's Hosp., Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2): 1157; 1977.

4265 DIETARY FIBRE IN PERSPECTIVE [Letter to Editor]. (Eng.) Vickery, K. (Avenue House, Eastbourne BN21 3WY, England). *Lancet* 2 (8034):408; 1977.

4266 DUODENAL GASTRIN CONCENTRATION IN UPPER GASTROINTESTINAL DISORDERS [Abstract]. (Eng.) Hughes, W. (Univ. Texas Medical Branch, Galveston, TX). *Gastroenterology* 72(5, Part 2): 1073; 1977.

4267 SERUM α-FETOPROTEIN CONCENTRATION IN ADULT PATIENTS UNDER CORTICOID, ESTROPROGESTATIVE OR ANDROGEN THERAPY. (Eng.) Chayvialle, J. A. P.; Courpron, P.; Mikaelian, S.; Lambert, R. (INSERM, U 45, Hopital Edouard-Herriot, F-69374 Lyon Cedex 2, France). *Digestion* 15(3):223-226; 1977.

See also, 3481, 3502, 3788, 3799, 3805, 3809, 3812, 3832, 3852, 3872, 3883, 3908, 3916, 3928, 3935, 3936, 3939, 3949, 3991, 4167, 4186, 4277, 4279.

GENERAL

Parasitology

4268 HYDATID DISEASE SCREENING: SANPETE COUNTY, UTAH, 1971-1976. (Eng.) Barbour, A. G.; Everett, J. R.; Andersen, F. L.; Nichols, C. R.; Fukushima, T.; Kagan, I. G. (Univ. Utah Medical Center, Salt Lake City, UT 84132). *Am. J. Trop. Med. Hyg.* 27(1):94-100; 1978.

Between 1971 and 1976, approximately 20% (2,265) of the population of Sanpete County, Utah, was screened for hydatid disease (*Echinococcus granulosus*) by intradermal, indirect hemagglutination and bentonite flocculation tests. In addition, dogs owned by the persons tested were purged with arecoline hydrobromide and the stool mucus was examined for cestodes. Of 34 persons who had follow-up chest radiographs and radioisotope liver scans, 6 were found to have asymptomatic hepatic cysts. If a participant who had pulmonary cysts and negative screening tests was included, the prevalence of asymptomatic hydatid disease would be 3/1,000. During the same period, 82 of 553 dogs successfully purged and examined had *E. granulosus* infections. Human cyst carriage was associated with dog ownership, particularly of infected dogs or in conjunction with sheep raising as the main livelihood. Combinations of immunodiagnostic tests were more efficacious in identifying cyst carriers than the tests used singly. Limitation of screening to high-risk groups (e.g., sheep raisers with dogs) can reduce costs without reducing yield. Optimum management of the cyst carrier awaits further information on the natural history of asymptomatic hydatid disease.

4269 CYTOLOGIC DIAGNOSIS OF ECHINOCOCCOSIS. (Eng.) Garret, M.; Herbsman, H.; Fierst, S. (Downstate Medical Center, Brooklyn, NY 11203). *Acta Cytol. (Baltimore)* 21(4):553-554; 1977.

4270 AMEBIC PERITONITIS. (Eng.) Monga, N. K.; Wig, J. D.; Sood, K. C.; Dutta, D. V.; Kaushik, S. P. (Postgraduate Inst. Medical Education and Res., Chandigarh, India). *Int. Surg.* 62(8):431-432; 1977.

4271 INTRAPERITONEAL RUPTURE OF AMEBIC LIVER ABSCESS. (Eng.) Singh, K. P.; Sreemannarayana, J.; Mehdiratta, K. S. (General Hosp., Pondicherry 605 006, India). *Int. Surg.* 62(8):432-434; 1977.

4272 SEVERE AMEBIASIS IN EARLY INFANCY: A REPORT OF 3 CASES ASSOCIATED WITH HIGH PREVALENCE RATES AMONG FAMILY MEMBERS [Abstract]. (Eng.) Dykes, A. C.; Ruebush, T. K.; Cherry, J. D. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA). *Pediatr. Res.* 12(4, Part 2): 423; 1978.

4273 ANERGY AND AMEBIC LIVER ABSCESS. (Eng.) Aguilar-Torres, F. G.; Jackson, L. J.; Rytel, M. W. (8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Wis. Med. J.* 76(10):S124-S125; 1977.

4274 RECTAL BLEEDING DUE TO Oesophagostomum brumpti: REPORT OF A CASE. (Eng.) Leoutsakos, B.; Agnadi, N.; Kolisiatis, S. (23A El. Venizelov Str., Zographou, Athens T623, Greece). *Dis. Colon Rectum* 20(7):632-634; 1977.

4275 INTESTINAL FUNCTION AND MORPHOLOGY IN STRONGYLOIDIASIS. (Eng.) Garcia, F. T.; Sessions, J. T.; Strum, W. B.; Schweistris, E.; Tripathy, K.; Bolanos, O.; *et al.* (Hospital Universitario, Cali, Colombia). *Am. J. Trop. Med. Hyg.* 26 (5, Part 1):859-865; 1977.

4276 INVESTIGATION OF THE SERUM VITAMIN A LEVEL IN ASCARIASIS. (Hun.) Csontos, F.; Varnai, E.; Tihanyi, L.; Gallovich, E.; Simovits, M.; Bekefi, J.; Toth, L. (Baranya megyei Kozegeszsegugyi-Jarvanyugyi Allomas, Pecs, Hungary). *Orv. Hetil.* 119(3):135-136; 1978.

4277 TOXICOLOGICAL AND MEDICAL ASPECTS OF ACUTE BACTERIAL ENTEROPATHY. (Ita.) Donatelli, L. (I Facolta di Medicina e Chirurgia, Universita di Napoli, Naples, Italy). *Clin. Ter.* 81(3):189-211; 1977.

See also, 3722, 3840, 3842, 3845, 3871, 3885.

GENERAL

Regional Enteritis

4278 BILE ACID STUDIES IN UNCOMPLICATED CROHN'S DISEASE. (Eng.) Vantrappen, G.; Ghoos, Y.; Rutgeerts, P.; Janssens, J. (Dept. Medical Res., Univ. Leuven, Leuven, B-3000, Belgium). *Gut* 18(9): 730-735; 1977.

Bile acid composition and pool size were studied in 13 unoperated patients with uncomplicated Crohn's disease (CD), 10 patients with ulcerative colitis (UC), and 10 normal subjects to determine the disorders of bile acid metabolism that are associated with the disease process itself. The bile acid pool size of the CD patients was significantly reduced (1.48 ± 0.16 g) as compared with the normal subjects (3.09 ± 0.27 g, $p<0.001$) and UC patients 2.92 ± 0.40 g, $p<0.01$). A significantly increased ($p<0.02$) amount of ursodeoxycholic acid (6.60 ± 1.93%) was found in the bile of many CD patients as compared with normal subjects (1.39 ± 0.12%) and UC patients (0.72 ± 0.34%). The ratio of glycine to taurine conjugates was greater in Crohn's disease than in normal subjects (5.15 ± 0.39 and 2.35 ± 0.17, resp.; $p<0.001$) or in UC patients (2.22 ± 0.27). Unconjugated bile acids constituted 4.64 ± 1.64% of the pool in CD patients, 2.59 ± 1.17% in normal subjects, and 7.02 ± 2.70% in UC patients.

Both the ESR and the serum cholesterol level correlated with the activity of the disease ($p<0.01$ and $p<0.05$, resp.). However, the parameter that correlated best with the activity index was the bile acid pool size ($p<0.001$): the more active the disease, the smaller the pool size. The latter finding suggests that the intestinal segment in which bile acid absorption is impaired in CD patients is much more extensive than the lesions demonstrated by radiological examinations.

4279 AMYLOIDOSIS AND CROHN'S DISEASE. (Eng.) Fausa, O.; Nygaard, K.; Elgjo, K. (Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 12(6):657-662; 1977.

Clinical findings in 7 patients with amyloidosis who were found among 85 patients subjected to intestinal resection for Crohn's disease between 1962 and 1974 are presented. Most patients had symptoms of inflammatory bowel disease of relatively short duration before amyloidosis was diagnosed and were without suppurative complications. Systemic involvement was seen in six patients. One died postoperatively from renal failure, and in two other patients, kidney transplantation was performed because of deterioration of a pre-existent renal insufficiency. Six patients were alive 6 months to 10 yr after amyloidosis was diagnosed. There is great risk of rapid deterioration of kidney function postoperatively in these patients. However, the authors' experiences suggest that in some cases the progression of amyloidosis may be delayed or prevented after surgical treatment of Crohn's disease.

4280 PYODERMA GANGRENOSUM COMPLICATING CROHN'S DISEASE. (Eng.) Korelitz, B. I.; Sommers, S. C. (Dept. Medicine, Lenox Hill Hosp., 100 E. 77th St., New York, NY 10021). *Am. J. Gastroenterol.* 68(2):171-176; 1977.

The 10-yr course of a woman (8-18 yr) with pyoderma gangrenosum complicating Crohn's disease is reported because of its rarity. The development of the skin lesions, their association with the inflammatory bowel disease, and their treatment are discussed. At age 8, the patient had an onset of abdominal cramps, fever, anorexia, and loose nonbloody stools. A barium enema showed narrowing and loss of haustrations in the transverse colon, more marked distally, with eccentric involvement of the circumference and pseudodiverticula formation. At age 11, skin eruptions developed on the extremities, flanks, and groin, characterized by clear drops with red halos suggesting pustules or infected erythema nodosum. At age 15, she had loose stools and recurrent skin lesions, two of which were only 4-5 mm across but looked like pyoderma gangrenosum. At age 18, she had recurrent nausea, chills, and loose stools accompanied by multiple round punched out ulcerations of the skin (1-5 mm in diameter). The patient was always treated with ACTH followed by prednisone plus maintenance therapy with salicylazosulfapyridine. Experience with pyoderma gangrenosum found in the literature is summarized. The treatment of pyoderma gangrenosum is the treatment of the underlying inflammatory bowel disease. High-dose steroid therapy led to remission of the disease, and the salicylazosulfapyridine prevented recurrences.

4281 COLONIC-DUODENAL FISTULA IN CROHN'S DISEASE. (Eng.) Korelitz, B. I. (45 E. 85 St., New York, NY 10028). *Am. J. Dig. Dis.* 22(12): 1040-1048; 1977.

Clinical and radiological findings in four cases of colonic-duodenal fistula complicating Crohn's disease are presented. In three instances, the fistula served as an indication for surgical intervention. After ileosigmoidostomy, ileorectal anastomosis, and ileostomy alone, the patients improved clinically but x-ray evidence of patency of the fistula persisted. Recurrent activity of the Crohn's disease in two patients responded to medical treatment, as it did in one patient without surgery at all. The internal fistula need not be a serious complication of Crohn's disease and should not serve as an indication for surgical correction for its own sake.

4282 CROHN'S DISEASE: STUDY OF 20 CASES. (Spa.) Daza Coronado, A.; Diaz Oller, J.; Dominguez D.-Adame, J.; Donado S. de Leon, J. L.; De Los Santos, D. (Ciudad Sanitaria "Virgen del Rocio," Residencia "Garcia Morato," Seville, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(2):139-148; 1977.

4283 SYMPOSIUM ON "CROHN'S DISEASE IN GALICIA, SPAIN." (Spa.) Fiol, M.; Ruiz Ochoa, V.; Portela Perez, D.; Gonzalez Abraldes, R.; Potel Lesquereux, J.; Perez Villanueva, J. (Hospital General de Galicia-Santiago, Galicia, Spain). *Rev. Esp. Enferm. Apar. Dig.* 50(4):469-482; 1977.

4284 FREE PERFORATION IN CROHN'S DISEASE [Abstract]. (Eng.) Katz, S.; Katzka, I.; Platt, N. (Long Island Jewish-Hillside Medical Center, New Hyde Park, NY). *Gastroenterology* 72(5, Part 2):1078; 1977.

4285 ZINC DEFICIENCY: A COMPLICATION OF CROHN'S DISEASE [Abstract]. (Eng.) McClain, C. J. (Veterans Admin. Hosp., Minneapolis, MN). *Gastroenterology* 72(5, Part 2):1099; 1977.

See also, 3818, 4021, 4052, 4053, 4056, 4057, 4058.

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GASTROENTEROLOGY

ABSTRACTS
AND
CITATIONS

NATIONAL INSTITUTE OF ARTHRITIS, METABOLISM, AND DIGESTIVE DISEASES

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HEALTH, EDUCATION, AND WELFARE
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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

GASTROENTEROLOGY ABSTRACTS and CITATIONS is published monthly and includes citations and abstracts from the biomedical world literature as they are currently received. In addition, yearly cumulated subject and author indexes are published.

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SUBJECT INDEX

The Secretary of the Department of Health, Education, and Welfare has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through April 30, 1981.

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NOTE

Journal names are abbreviated according to the list of abbreviations used by *Index Medicus*. For journals not covered by *Index Medicus*, the abbreviations (with some modifications) found in *International Standard ISO833, 1974*, are used. The two-letter state abbreviations are based on the United States Postal Service Code.

LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, µl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter		
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotidephosphate
dl	deciliter		
DNA	deoxyribonucleic acid	NADPH	reduced nicotinamide adenine dinucleotidephosphate
ED_{50}	median effective dose(s)		
EDTA	ethylenediamine tetraacetic acid	ng	nanogram (10^{-9})
e.g.	for example	nm	nanometer(s)
EEG	electroencephalogram	Pa	ambient pressure
ESR	erythrocyte sedimentation rate	PAS	periodic acid - Schiff
g	gram(s)	pg	picogram (10^{-12})
µg	microgram(s)	pgEq	picogram equivalent(s)
Hz	Hertz	p.o.	orally
hr	hour(s)	ppb	parts per billion
Ig	immunoglobulin(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K_m	Michaelis constant	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
µM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, µCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

4286 THE LIGHT AND ELECTRON MICROSCOPIC DISTRIBUTION OF ACID PHOSPHATASE ACTIVITY IN HUMAN NORMAL OESOPHAGEAL EPITHELIUM. (Eng.) Hopwood, D.; Logan, K. R.; Milne, G. (Ninewells Hosp. and Medical Sch., Dundee, Scotland). *Histochem. J.* 10(2):159-170; 1978.

The fine structural localization of acid phosphatase (AcPase) activity in human normal esophageal epithelium obtained by biopsy was studied with light and electron microscopy to determine whether it conforms to the general cellular pattern reported for other animals, if the membrane-coating granules are AcPase-positive, and if the distribution of activity helps explain the function of the granules in the esophagus. The highest activity was seen in the prickle cell layer merging into the lower functional layer. Electron microscopy revealed activity to be localized in GERL (the specialized region of the endoplasmic reticulum associated with the Golgi apparatus, which shows hydrolase activity that is also present in lysosomes), lysosomes, and membrane-coating granules, which probably secrete their contents into the intercellular space in the central part of the functional layer. AcPase activity is shown to correspond in its distribution to that found in other animal tissues. It is hypothesized that the membrane-coating granules play a role in the freeing of superficial cells for sloughing and the restriction of fluid loss between the cells.

4287 INFLUENCE OF STARVING ON THE RAT GASTRIC MUCOSA: LIGHT AND ELECTRON MICROSCOPICAL FINDINGS. (Eng.) Zaviacic, M.; Brozman, M.; Jakubovsky, J. (Medical Sch., Komensky Univ. Bratislava, Sasinkova 4, 80100 Bratislava, Czechoslovakia). *Exp. Pathol. (Jena)* 14(3/4):122-130; 1977.

The histology and ultrastructure of the rat gastric mucosa were investigated after 24, 48, 72, 144, and 168 hr of starvation. An increased desquamation of individual foveolar cells was found. In the preserved cells of the foveolae, the content of PAS-positive mucosubstances did not change during starvation, and no ultrastructural changes took place in the appearance or in the amount of the mucous granules. The number of lipid droplets increased in the mucous foveolar cells within 24 and 48 hr. During starvation, the mitochondria (mainly in the parietal cells) were enlarged and contained rare mitochondrial cristae. Some mitochondria were disintegrated and removed by lysosomes. The number of lysosomes (mainly cytosegresomes) was markedly increased in the parietal cells. A collapse of the intracellular canaliculi occurred, and the tubulovesicular profiles were narrowed. In chief cells, the profiles of the granular endoplasmic reticulum and Golgi apparatus were reduced. The ultrastructural changes induced by starvation can be interpreted functionally in changed histochemical parameters of the gastric mucosa.

4288 GASTRIC AND DUODENAL MUCOSA IN 'HEALTHY' INDIVIDUALS: AN ENDOSCOPIC AND HISTOPATHOLOGICAL STUDY OF 50 VOLUNTEERS. (Eng.) Kreuning, J.; Bosman, F. T.; Kuiper, G.; Lindeman, J. (Univ. Medical Center, Wassenaarseweg 62, Leiden, Netherlands). *J. Clin. Pathol.* 31(1):69-77; 1978.

To gain information on the variation in appearance of normal gastric and duodenal mucosa, and to determine the density of cellular infiltrate in the lamina propria and the relative numbers of different immunoglobulin-producing plasma cells, biopsy specimens from 50 volunteers without a clinical history of gastrointestinal disease were examined histologically and immunohistochemically. The antrum and fundus were normal in 32 of the 50 subjects, but the other 18 showed histopathological evidence of gastritis in either the antrum or fundus. The latter entity appeared to be age-related: 4, 4, 8, and 2 patients were in the age-groups 20-29, 30-39, 40-49, and 50-59, resp. Moderate to severe atrophy occurred in one patient in the 30-39 age group, four patients in the 40-49 age group, and one patient in the 50-59 age group. There was considerable variation in the appearance of the surface epithelium of the duodenum within and among individual subjects. Superficial gastric metaplasia in one or more biopsy specimens from the duodenal bulb was found in 64% of the individuals. Histopathological examination revealed signs of chronic inflammation in 12% of the subjects. In two cases, there was active inflammation but in only one of these was the diagnosis made on endoscopic appearances. Brunner's glands were found above the muscularis mucosae in 48 subjects, and in only 17 subjects were they present in the descending part of the duodenum. The number of plasma cells in different biopsy specimens from subjects not showing histological signs of inflammation was variable. The ratio IgA:IgG:IgM-producing plasma cells was constant from subject to subject as well as from specimen to specimen. The average ratio IgA:IgG:IgM was 10:2.4:1.1. This study reveals that histological evidence of severe gastritis or severe duodenitis may exist without clinical symptoms. It also shows that the normal duodenal mucosa may show considerable morphological variation.

4289 ACUTE AND CHRONIC EFFECTS OF 1,2 DIMETHYLHYDRAZINE IN MOUSE LARGE BOWEL MUCOSA [Abstract]. (Eng.) Deschner, E. (Memorial Sloan-Kettering Cancer Center, New York, NY). *Gastroenterology* 72(5, Part 2):1048; 1977.

4290 EVIDENCE FOR A NON-SYMMETRICAL ORIENTATION OF VAGAL EFFERENT FIBERS [Abstract]. (Eng.) Innes, D. L.; Martin, J. S.; Lang, I.; Tansy, M. F. (Temple Univ. Health Science Center, Philadelphia, PA 19140). *Fed. Proc.* 36(3):462; 1977.

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

4291 SCANNING AND TRANSMISSION ELECTRON MICROSCOPIC STUDIES ON THE EFFECTS OF BILE AND ASPIRIN ON THE GASTRIC MUCOSA OF THE RAT [Abstract]. (Eng.) Winborn, W. B.; Guerrero, D. L.; Hodge, E. E. (Univ. Texas Health Science Center at San Antonio, San Antonio, TX). *Gastroenterology* 72(5, Part 2):1168; 1977.

4292 HISTO- AND CYTOCHEMICAL ANALYSES OF THE PHAGOSOMES IN THE MUCOID CELLS OF THE MOUSE STOMACH EPITHELIUM [Abstract]. (Eng.) Sterle, M.; Pipan, N.; Psenicnik, M. (Inst. Human Biology, Ljubljana, Yugoslavia). *Acta Anat. (Basel)* 99(1): 115; 1977.

4293 ENDOCRINE CELLS OF THE STOMACH AND RELATED GROWTHS [Abstract]. (Eng.) Solcia, E.; Capella, C.; Buffa, R.; Frigerio, B.; Usellini, L.; Fontana, P. (Centro di Diagnostica Istopatologica Istochimica ed Ultrastrutturale dell'Universita di Pavia a Varese, Italy). *Rend. Gastroenterol.* 9(1): 58; 1977.

4294 COMBINED HISTOCHEMICAL AND IMMUNOFLUORESCENCE STUDY OF THE INNERVATION OF THE ANTRAL GASTRIN-PRODUCING CELLS IN THE RAT [Abstract]. (Eng.) Lechago, J.; Barajas, L. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA). *Gastroenterology* (5, Part 2):1162; 1977.

See also, 4316, 4328, 4372, 4380, 4430, 4487, 4490, 4495, 4497, 4514, 4524, 4525, 4583, 4588, 4589, 4666, 4709, 4756, 4813, 4926.

ABSORPTION - EXCRETION - TRANSPORT

4295 EXPERIMENTAL STUDIES ON FLUID PATHOPHYSIOLOGY IN SMALL INTESTINAL OBSTRUCTION IN THE RAT. I. EFFECTS OF INTRALUMINAL HYPEROSMOLALITY. (Eng.) Johnson, L.; Nordstrom, H.; Nylander, G. (Karolinska Hosp., 104 01 Stockholm, Sweden). *Scand. J. Gastroenterol.* 13(1):49-56; 1978.

An experimental model was constructed using male albino Sprague-Dawley rats with an extraperitonealized 50-cm loop of the distal ileum to study the transfer of fluids to the intestinal lumen associated with ileus and its relationship to other factors such as parenteral administration of fluids. When 3 ml of a hyperosmolal glucose solution (1,600 mOsm/kg) were introduced into the empty loop, the intestinal mucosa functioned as a semipermeable membrane and permitted only fluids of low osmolality to enter the intestinal lumen, thus tending to normalize its hyperosmolal contents. The initial fluid volume was increased continuously by dilution and had tripled after 1 hr. The process of dilution followed a simple dilution curve. The osmolality of the intestinal fluid decreased rapidly and inversely to the increase in volume, being one-third the original osmolality after 1 hr and one-fourth the original after 2 hr. The intraluminal pressure increased steadily to 35 mm H_2O at the end of the 2-hr experiment, yet the transfer of fluid into the lumen continued for the whole experimental period, indicating increased smooth muscle tone probably due to hyperosmolal provocation. At the same time, hemoconcentration and serum osmolality both increased, reflecting the mobilization of fluids from the extravascular (80% of total mobilized) and vascular compartments. The continued accumulation of fluid in the intestinal lumen at a constant rate conflicts with the idea that pressure has an effect on the amount of fluid that accumulates.

4296 THE RELATIONSHIP BETWEEN VITAMIN D-STIMULATED CALCIUM TRANSPORT AND INTESTINAL CALCIUM-BINDING PROTEIN IN THE CHICKEN. (Eng.) Spencer, R.; Charman, M.; Wilson, P. W.; Lawson, E. M. (Univ. Cambridge and Medical Res. Council, Milton Rd., Cambridge CB4 1XJ, England). *Biochem. J.* 170(1):93-101; 1978.

The rapid stimulation of intestinal Ca^{2+} transport observed in vitamin D-deficient chicks administered 1,25-dihydroxycholecalciferol prompted a re-evaluation of the correlation previously observed between this stimulation and the induction of calcium-binding protein synthesis. By 1 hr after a dose of 125 ng of 1,25-dihydroxycholecalciferol, Ca^{2+} transport was increased. This increase occurred at least 2 hr before calcium-binding protein was detected immunologically and 1 hr before synthesis of the protein began on polyribosomes; thus, the hormone stimulates Ca^{2+} transport before calcium-binding protein biosynthesis is induced. The maximum increase in Ca^{2+} transport observed after this dose of 1,25-dihydroxycholecalciferol (attained by 8 hr) was similar to that observed after 1.25-25 μg of cholecalciferol, but the stimulation was only short-lived, in contrast with the effect observed after the vitamin was given. Later, after hormone administration, when Ca^{2+} transport had declined to its basal rate, the cellular content of calcium-binding protein remained elevated. Calcium-binding protein was synthesized on free rather than on membrane-bound polyribosomes, which implies that it is an intracellular protein. Rachitic chicks required the presence of dietary calcium for maximum stimulation of calcium-binding protein production by cholecalciferol. These results suggest that calcium-binding protein is an intracellular protein, and that its synthesis may be a consequence of the raised intracellular calcium content of the intestinal epithelial cells resulting from 1,25-dihydroxycholecalciferol-stimulated Ca^{2+} transport. It is proposed that calcium-binding-protein synthesis is necessary for maintaining the stimulated rate of Ca^{2+} transport, which is initiated by other factors.

4297 INTESTINAL TRANSPORT OF WEAK ELECTROLYTES: DETERMINANTS OF INFLUX AT THE LUMINAL SURFACE. (Eng.) Jackson, M. J.; Williamson, A. M.; Dombrowski, W. A.; Garner, D. E. (George Washington Univ. Medical Center, Washington, DC 20037). *J. Gen. Physiol.* 71(3):301-327; 1978.

The possibility that the intestinal transport of weak electrolytes is influenced by a region of distinctive pH at the luminal surface of the epithelial cell layer was examined using intestinal segments from male Wistar rats. The intestinal segments were exposed to various weak electrolytes (15 weak acids and 6 weak bases) in influx chambers. The uptake observed during the 1-min exposure period represented a unidirectional flux that was not complicated by a significant backflux. The determinants of weak electrolyte influx could be described mathematically in terms of the resistance of the unstirred layer to movement from the bulk phase to the cell surface, the degree of ionization of the weak electrolyte at the cell surface, and the cellular permeability to the nonionized weak electrolyte. The unstirred layer was totally rate-limiting in the cases of some poorly ionized or highly permeant compounds but not for most of the compounds studied. The experiments suggest that the pH value that influences weak electrolyte influx into intestinal epithelial cells is equal to the pH in the mucosal fluid bulk phase and do not provide support for the concept of a superficial region of distinctive pH as a significant determinant of weak electrolyte influx.

4298 COMPARATIVE INTESTINAL AND COLONIC ABSORPTION OF [4-^{14}C]CHOLESTEROL IN THE RAT. (Eng.) Roy, T.; Treadwell, C. R.; Vahouny, G. V. (George Washington Univ. Sch. Medicine and Health Sciences, Washington, DC 20037). *Lipids* 13 (1):99-101; 1978.

To determine whether sterols are significantly absorbed by the colon, the absorption of [4-^{14}C]cholesterol was compared in the duodenum and in the cecum of rats. [4-^{14}C]Cholesterol was administered as an aqueous emulsion with triolein and dry non-fat milk either directly into the upper duodenum or into the ileocecal junction of lymph duct cannulated rats. Lymph flow rates were similar in the two groups of animals. Whereas approximately 53% of the administered tracer dose of cholesterol was absorbed when introduced into the upper small intestine, only 0.06% appeared in lymph when administered into the cecum. Furthermore, less than 0.01% of the administered isotope was detected in urine and blood. These data demonstrate that the large intestine does not contribute significantly to the absorption of exogenous cholesterol in the rat.

4299 EFFECT OF ENZYME-INDUCING AND ENZYME-INHIBITING AGENTS ON DRUG ABSORPTION I: 3-O-METHYLGLUCOSE TRANSPORT IN RATS. (Eng.) Ravis, W. R.; Feldman, S. (Dept. Pharmaceutics, Univ. Houston, Houston, TX 77004). *J. Pharm. Sci.* 67(2):245-248; 1978.

The influence of pre-administration of phenobarbital, benzo[*a*]pyrene, or proadifen hydrochloride on 3-*O*-methylglucose transfer across the everted rat small intestine was examined. The active and passive components of the sugar transport mechanism were evaluated using 0.08 mM phlorizin, a potent inhibitor of active transport of sugars. Pretreatment of the animals with phenobarbital (80 mg/kg, i.p. or p.o. for 3 consecutive days) did not alter 3-*O*-methylglucose transfer characteristics. Pretreatment with i.p. administered benzo[*a*]pyrene (20 mg/kg) increased mucosal to serosal transfer of the sugar at low (0.1 mM) sugar concentrations. Enhancement of the active transfer of 3-*O*-methylglucose by pretreatment with proadifen hydrochloride (100 mg/kg, i.p. or p.o.) was noted at low sugar concentrations. The passive transfer of the sugar was reduced after pretreatment with proadifen hydrochloride. The situation in treated animals is complex and requires further study before a conclusion can be reached.

4300 DUAL ACTION OF CHOLERA TOXIN ON ELECTROLYTE AND NON-ELECTROLYTE TRANSPORT IN THE CANINE INTESTINAL MUCOSA [Abstract]. (Eng.) Robinson, J. W. L.; Mirkovitch, V.; Sepulveda, F. V.; Menge, H. (Centre Hospitalier Universitaire Vaudois, 1011 Lausanne, Switzerland). *Digestion* 16(1/2):217-218; 1977.

4301 EFFECT OF VARIATIONS IN THE RESISTANCE OF THE UNSTIRRED WATER LAYER ON THE INTESTINAL UNIDIRECTIONAL FLUX OF GLUCOSE IN CONTROL AND ALLOXAN-DIABETIC RATS [Abstract]. (Eng.) Thomson, A. B. R. (Dept. Medicine, Univ. Alberta, Edmonton, Alberta, Canada). *Clin. Res.* 26(2):114A; 1978.

4302 PATHWAYS OF WEAK ACID TRANSPORT IN RAT JEJUNUM [Abstract]. (Eng.) Hatch, W. J. (Texas Coll. Osteopathic Medicine, Denton, TX 76203). *Fed. Proc.* 37(3):697; 1978.

4303 BILE SALT-ENHANCED JEJUNAL MACROMOLECULAR ABSORPTION [Abstract]. (Eng.) Fagundes-Neto, U.; Teichberg, S.; Bayne, M.; Morton, B.; Lifshitz, F. (North Shore Univ. Hosp., Manhasset, NY). *Fed. Proc.* 37(3):699; 1978.

4304 TRITIATED GLYCEROL TRIETHER (^{3}H-TGE) AND β-SITOSTEROL (β-S) AS OIL PHASE MARKERS [Abstract]. (Eng.) Cortot, A.; Phillips, S. F.; Malagelada, J. R. (Mayo Clinic, Rochester, MN). *Clin. Res.* 25(4):607A; 1977.

4305 MUCOSAL CALCIUM BINDING PROTEIN (CaBP) IN RAT CECUM AND COLON: EFFECTS OF VITAMIN D DEPLETION (-D) AND REPLETION (+D) [Abstract]. (Eng.) Petith, M. M.; Wilson, H. D.; Schedl, H. P. (Univ. Iowa Coll. Medicine, Iowa City, IA). *Clin. Res.* 25(4):566A; 1977.

4306 INTESTINAL ADAPTATION TO AGE: IN VIVO CECAL AND COLONIC CALCIUM (Ca) FLUX IN THE RAT [Abstract]. (Eng.) Petith, M. M. (Univ. Iowa Coll. Medicine, Iowa City, IA). *Clin. Res.* 25(4):623A; 1977.

See also, 4312, 4371, 4490, 4496, 4716, 4787.

MOTILITY

4307 MANOMETRY AND ELECTROMYOGRAPHY OF THE UPPER ESOPHAGEAL SPHINCTER IN THE OPOSSUM. (Eng.) Asoh, R.; Goyal, R. K. (Univ. Texas Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *Gastroenterology* 74(3):514-520; 1978.

Studies were performed in anesthetized and conscious opossums to define the genesis of resting pressure and opening of the upper esophageal sphincter. Intraluminal pressures were measured with low compliance, perfused catheters. Electromyograms were recorded using miniature concentric bipolar electrodes from the cricopharyngeus, inferior pharyngeal constrictor, middle pharyngeal constrictor, proximal end of the esophagus, and geniohyoid muscles. Upper esophageal sphincter pressure showed radial as well as axial asymmetry; the pressures were higher in conscious than in anesthetized animals. Electromyographically, only the cricopharyngeus and inferior pharyngeal constrictor fired continuously at rest and ceased to fire during swallowing. *d*-Tubocurarine or section of the motor nerve abolished electrical activity in the cricopharyngeus and inferior pharyngeal constrictor and caused marked reduction but not obliteration of upper esophageal sphincter pressure. Contraction of the geniohyoid muscle abolished the remaining pressure in the upper esophageal sphincter. Moreover, contraction of the geniohyoid muscle caused a fall in upper esophageal sphincter pressure, even when the cricopharyngeus and inferior pharyngeal constrictor were kept contracted. These studies indicate that (1) the upper esophageal sphincter corresponds mainly to the cricopharyngeus and inferior pharyngeal constrictor, (2) the resting upper esophageal sphincter pressure is attributable to continuous active muscle contraction as well as to the elasticity of the surrounding structures, and (3) the opening of the upper esophageal sphincter is attributable to the inhibition of the contraction of the cricopharyngeus and inferior pharyngeal constrictor and the forward displacement of the larynx by the geniohyoid muscle.

4308 OESOPHAGEAL PERISTALSIS. A SIMPLE SYSTEM FOR THE RECORDING OF OESOPHAGEAL PERISTALSIS, AND THE INFLUENCE OF BOLUS VOLUME ON PEAK PERISTALTIC PRESSURE AMPLITUDE. (Eng.) Boesby, S.; Sondergaard, E. Y.; Madsen, T. (Odense Sygehus, Sdr. Boulevard 29, DK-5000, Odense C, Denmark). *Scand. J. Gastroenterol.* 13(2):149-153; 1978.

To simplify and improve esophageal pressure recordings and to determine the influence of dry and wet swallows of different bolus volumes on recorded pressure amplitudes, the peak esophageal peristaltic pressure amplitude was recorded in eight healthy subjects at points 5-cm and 15-cm proximal to the gastroesophageal sphincter by using an *in situ* tip-transducer simultaneously with a continuous flush perfused catheter system with external pressure transducer. Dry swallows and wet swallows of 2.5, 5, or 10 ml were made in random succession, three of each at 30-sec intervals. The mean peak esophageal peristaltic pressure amplitudes (in mm Hg) recorded by the *in situ* tip transducer at the 5-cm and 15-cm points, resp., were 34 and 30 (dry swallow), 56 and 45 (2.5-ml bolus), 54 and 49 (5-ml bolus), and 65 and 45 (10-ml bolus). The mean peak pressure amplitudes (in mm Hg) recorded by the perfused catheter at the 5-cm and 15-cm points, resp., were 31 and 26 (dry swallow), 53 and 43 (2.5-ml bolus), 51 and 46 (5-ml bolus), and 55 and 41 (10-ml bolus). In all cases, the pressures recorded by either system correlated well, and the peristaltic pressure amplitude was significantly higher ($p<0.10$) after the wet swallows. In addition, the difference in bolus volumes did not influence the peristaltic pressure amplitude. A possible explanation for the difference between pressures after wet and dry swallows is that, as a result of the distention caused by passage of the bolus, the length-tension characteristics become more optimal for the functioning of the esophageal musculature than is the case after a dry swallow. In conclusion, the simple catheter and flow system used in this study permits recording of peristaltic pressures independent of the shape of the transducer, and it is therefore well-suited for measuring esophageal contractions.

4309 EFFECT OF GASTRIC ANTRUM ON REGULATION OF LOWER ESOPHAGEAL SPHINCTER PRESSURE IN THE DOG.

(Eng.) Koelz, H. R.; Hollinger, A. P.; Sauberli, H.; Largiader, F.; Siewert, R.; Blum, A. L. (Kantonsspital, Univ. Zurich, Zurich, Switzerland). *Am. J. Physiol.* 234(2):E157-E161; 1978.

The role of the antrum in the regulation of lower esophageal sphincter pressure (LESP) was investigated in three unrestrained dogs equipped with Komarov-type esophagostomy, innervated antral pouch, and gastrojejunostomy. The integrity of the antrum was shown by gastrin release after 20% peptone perfusion of the antrum and after the i.v. injection of insulin (0.4 U/kg). The ability of the lower esophageal sphincter to respond to known stimuli was demonstrated by a dose-dependent rise of LESP after i.v. pentagastrin. Peptone instillation into the main stomach raised LESP from the basal 18.6 ± 1.8 to a maximum of 36.3 ± 2.7 mm Hg but had no effect on serum gastrin. Antral distention with water or 0.1 M $NaHCO_3$, as well as antral perfusion with 0.1 M HCl followed by 0.1 M $NaHCO_3$, perfusion with 0.1 M $NaHCO_3$ followed by 0.1 M HCl, or peptone failed to affect LESP. It is concluded that the antrum and endogenous gastrin have little if any effect on LESP in dogs.

4310 EFFECT OF HISTAMINE AND HISTAMINE ANTAGONISTS ON HUMAN LOWER ESOPHAGEAL SPHINCTER FUNCTION.

(Eng.) Kravitz, J. J.; Snape, W. J., Jr.; Cohen, S. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Gastroenterology* 74(2):435-440; 1978.

The effect of histamine phosphate and specific histamine antagonists on human lower esophageal sphincter (LES) pressure was investigated in 31 fasting, healthy subjects. Continuous i.v. infusions of histamine (2.0-40.0 µg/kg/hr) gave graded increases in LES pressure with a peak response of 37.8 ± 4.6 mm Hg at 20.0 µg/kg/hr. The LES response was not altered by diphenhydramine (50 mg, i.v.), but was completely blocked by cimetidine infusion (4.0 mg/kg/hr). Also, p.o. cimetidine (300 mg) antagonized any increase in LES pressure during histamine infusion at a dose shown to give the maximal LES response. Despite this effect of cimetidine in antagonizing the maximal LES response to histamine, p.o. cimetidine at 200, 300, and 400 mg failed to alter basal LES pressure over a 3-hr period. Cimetidine also failed to alter the LES response to i.v. pentagastrin or p.o. beef hydrolysate. These studies suggest that (1) human LES pressure increases in response to i.v. histamine phosphate through its action at an H_2-receptor, (2) the H_1-receptor has no apparent role in the human LES response to histamine, and (3) H_2-antagonism with cimetidine has no effect on the human LES basal pressure or its response to gastrin stimulation.

4311 THE MYOELECTRIC COMPLEX OF THE SMALL INTESTINE AND VARIATIONS OF ALIMENTARY FLOW IN SHEEP.

(Fre.) Bueno, L. (Ecole Nationale Veterinaire, 31076 Toulouse Cedex, France). *C. R. Soc. Biol. (Paris)* 171(4):959-964; 1977.

The variations in the intestinal flow rate of sheep were compared to changes in the electrical activity of intestinal smooth muscle recorded by six groups of electrodes spaced from the antrum to the ileocecal junction while the animals were restrained in metabolic cages. In sheep fed a control diet, myoelectric complexes originated in the duodenal bulb at 70- to 100-min intervals and were propagated along the small intestine at a mean velocity of 21 cm/min. These complexes consisted of irregular activity lasting approximately 56 min followed by 5 min of regular and maximal activity and a resting stage. When the sheep were fasted for 48 hr, the chyme volume dropped from 400 ml/hr to 200 ml/hr, the duration of the irregular phase was reduced to 37 min, the duration of the regular phase increased to 7.5 min, and the velocity of propagation rose to 35 cm/min. In overfed sheep, the chyme volume rose to 520 ml/hr; the irregular phase lasted 84 min, but the regular phase or velocity did not differ significantly from controls. It is concluded that changes in intestinal flow rate are affected by the duration, number, and velocity of propagation of the myoelectric complexes, which propel ingesta through the small intestine.

4312 MOTILITY AND GLUCOSE ABSORPTION IN THE SMALL INTESTINE OF SHEEP.

(Fre.) Fioramonti, J.; Ruckebusch, M. (Ecole Nationale Veterinaire, 31076 Toulouse Cedex, France). *C. R. Soc. Biol. (Paris)* 171(4):964-969; 1977.

To examine the relationship between intestinal motility and/or transit and absorption, recurring myoelectric complexes and glucose absorption in the small intestine of three sheep were studied *in vivo* in isolated 2-m jejunal loops, using electrodes and a perfusion marker technique. Glucose was perfused through the jejunal segment at 37.5 mg/min, giving an intestinal flow of 225 ml/hr when the transit of ingesta was interrupted, or 480 ml/hr when the ingesta were allowed to pass normally through the loop. When the intestinal transit was not interrupted, the net absorption of glucose was 30% during the regular activity phase (RAP) and resting phase (RP) of the myoelectric complexes, and it decreased to 10% during the irregular activity phase (IAP), reaching its lowest point 2-6 min before the occurrence of the RAP. When glucose alone flowed through the loop, absorption was maximal during the RP, decreased during the IAP, and became minimal during the RAP. The intestinal flow rate, which was nil during the RP, increased to 8.3 ml/min during the RAP and to 32.4 ml/min during the IAP. These results suggest that, under normal physiological conditions, intestinal absorption occurs mainly during the RAP of myoelectric complexes.

4313 EFFECTS OF ENDOGENOUS PROSTAGLANDIN E ON INTESTINAL MOTILITY.

(Eng.) Sanders,

K. M.; Ross, G. (Mayo Foundation, Rochester, MN 55901). *Am. J. Physiol.* 234(2):E204-E208; 1978.

The role of endogenous prostaglandin E (PGE) in the regulation of intestinal motility *in situ* was studied in anesthetized cats. The basal concentration of ileal PGE was found by radioimmunoassay to be 3.3 ± 0.6 ng/wet weight (n=12). Intramesenteric arterial infusion of acetylcholine (ACh, 100 μg/min) increased intestinal motility, and PGE concentration rose to 6.7 ± 0.8 ng/g. The i.v. infusion of indomethacin (4 mg/kg) enhanced spontaneous and ACh-induced motility and abolished the ACh-induced rise in ileal PGE concentration. It is concluded that basal PGE synthesis limits the motility of the resting and ACh-stimulated cat ileum.

4314 FACTORS AFFECTING DELIVERY OF BILE TO THE DUODENUM IN MAN. (Eng.) Ashkin, J. R.; Lyon, D. T.; Shull, S. D.; Wagner, C. I.; Soloway, R. D. (Hosp. Univ. Pennsylvania, 3600 Spruce St., Philadelphia, PA 19104). *Gastroenterology* 74(3): 560-565; 1978.

Studies utilizing balloon occludable T or duodenal tubes in subjects with and without gallbladders were undertaken to identify the contribution of the gallbladder, the sphincter of Oddi, and bile salts to the delivery of bile to the duodenum. Patients with and without a functional sphincter of Oddi and with and without a gallbladder were compared. The presence of a functional sphincter of Oddi in duodenal-tube patients reduced bile salt output by more than 67% from that observed in T-tube patients. When cholecystectomized and normal patients were compared using the duodenal tube, peak bile salt output was significantly increased in normal subjects ($p<0.02$), reflecting gallbladder contraction, but total bile salt output was not significantly increased, suggesting that the gallbladder has a minor role in bile delivery. Exogenous cholecystokinin infusion (0.0625 Crick-Harper-Raper U/kg/min, i.v.) produced much more stable bile secretion than did endogenous release of cholecystokinin by intraduodenal infusion of essential amino acids. This rhythmic release of bile after endogenous cholecystokinin release was related to the concentration of bile salts in the intestinal lumen. Thus, delivery of bile to the duodenum is wave-like and is predominantly controlled by the sphincter of Oddi.

4315 THE EFFECT OF MOTILIN ON THE ELECTRICAL ACTIVITY OF RABBIT CIRCULAR DUODENAL MUSCLE. (Eng.) Riemer, J.; Kolling, K.; Mayer, C. J. (Institut fur Physiologie, Universitat Munchen, Pettenkoferstrasse 8, D-8000 Munchen, W. Germany). *Pfluegers Arch.* 372(2):243-250; 1977.

The effect of 13-norleucine motilin on electrical activity and membrane resistance of the rabbit circular duodenal muscle was studied with intracellular recording techniques. Electrical slow waves without spikes occurred in Krebs solution made twice hypertonic by the addition of sucrose. The slow waves were of the basic organ-specific rhythm (BOR) type. Their mean frequency was 18.1/min, their mean amplitude from trough to peak was 11.4 mV, and their mean membrane potential during the trough was -59.1 mV. Motilin (1×10^{-7} g/ml) caused membrane depolarization by a mean of 10.9 mV. Membrane resistance was reduced. The BOR slow waves were either reduced or abolished by motilin. Slow fluctuations of membrane potential characteristic of a minute-type rhythm (MR) appeared after the addition of the hormone, and trains of spikes occurred at the crests of the MR and were associated with contraction of the muscle. Two mechanisms may account for the correlation between membrane resistance and voltage: (1) motilin may increase conductance for one or more ion species whose equilibration potentials have lower negative values than the resting membrane potential or (2) motilin may induce some unknown mechanism that shifts the potential to lower negative values, constituting a decrease of membrane resistance as a consequence of rectifying properties.

4316 ON THE INFLUENCE OF LOW EXTRACELLULAR CALCIUM LEVEL ON THE CONTRACTILITY AND ULTRASTRUCTURE OF SMOOTH MUSCLE CELLS OF ILEUM AND COLON. (Eng.) Lowe, H.; Bergmann, J. (Akademie der Wissenschaften der DDR, Institut fur Wirkstofforschung, Alfred-Kowalke-Strasse 4, DDR-1136, Berlin, E. Germany). *Exp. Pathol. (Jena)* 14(3/4):180-188; 1977.

The effect of a low extracellular calcium concentration on the contractility and ultrastructure of the smooth muscle cells of the isolated guinea pig ileum and colon was studied. After the calcium level in the organ bath was decreased to one-tenth of the normal concentration, acetylcholine-induced ileal contraction decreased by 50%. The same effect was seen after the addition of 5×10^{-7} M verapamil to normal bath fluid (Tyrode solution). When isolated strips of ileum were incubated in a calcium-free bath for 20 min (37 C), myosin-like filaments were observed in the smooth muscle cells of the tunica muscularis. The same ultrastructural changes were demonstrated when verapamil (2×10^{-5} M) was added to the medium. In contrast, the taenia coli showed no changes in contractility when the calcium level in the organ bath was lowered, and there was no formation of myosin-like filaments. After the addition of verapamil, the contractility of the taenia coli decreased, but not in the same degree as that in the ileum. Ultrastructural changes were not demonstrated in the sarcoplasm of the smooth muscle cells with verapamil. The authors conclude that the contraction of the smooth muscle cells in the ileum is mainly caused by the influx of calcium from the extracellular space. In the taenia coli, however, contraction must be caused by the efflux of calcium from storage sites in the sarcoplasm. The formation of thick myofilaments may be a result of a change in myosin structure following a change in calcium concentration.

4317 ENDOGENOUS PROSTAGLANDIN E AND CONTRACTILE ACTIVITY OF ISOLATED ILEAL SMOOTH MUSCLE. (Eng.) Sanders, K. M. (Mayo Foundation, Rochester, MN 55901). *Am. J. Physiol.* 234(2):E209-E212; 1978.

The effects of endogenous prostaglandin E (PGE) on the contractile activity of isolated cat ileal muscle rings were studied. Force development in circularly oriented muscle fibers was recorded. The muscles contained a mean basal PGE concentration of 1 ± 0.6 ng/g wet weight, as measured by radioimmunoassay. Acetylcholine (ACh) administration or elevated potassium level caused contractions and enhanced PGE concentration ($p<0.05$). The removal of Ca^{2+} from solutions high in potassium blocked contraction, but PGE concentration still increased ($p<0.02$). The prostaglandin synthetase inhibitors, indomethacin and 5,8,11,14-eicosatetranoic acid reduced PGE concentration in muscles (<50 pg PGE/g muscle) and increased the magnitude of contractions induced by either ACh or elevated potassium. Spontaneous contractions were observed in many tissues after inhibition of PGE synthesis. Endogenous PGE limits spontaneous and depolarization-induced muscular activity in cat ileal circular muscle. PGE synthesis was increased by depolarizing stimuli, whether or not contractions were blocked by the removal of external calcium.

4318 QUALITATIVE AND QUANTITATIVE EVALUATION OF INTERNAL ANAL SPHINCTER FUNCTION IN THE NEWBORN. (Eng.) Boston, V. E.; Cywes, S.; Davies, M. R. Q. (Red Cross War Memorial Children's Hosp., Univ. Cape Town, South Africa). *Gut* 18(12): 1036-1044; 1977.

One hundred one normal neonates were examined manometrically in the first day of life to assess anorectal function. To overcome some of the difficulties in subjective interpretation of results, the stimuli used and the response pattern seen in the anal canal were measured. In the unstimulated state, all subjects demonstrated rhythmical changes in anal canal tone. Mean maximal intraluminal pressure in the anal canal decreased significantly after 10 hr of age ($p<0.01$) and after the first meconium stool ($p<0.02$). Only 5 of the 101 examined on the first day of life had an abnormal manometric response. It is significant ($p=0.0194$) that none of these had passed meconium at the time of examination, and that all had a normal response pattern at the age of 28 hr. In 20 babies, the sensitivity of the anorectal reflex was measured and found to be significantly increased ($p<0.01$) on the third day of life compared with the first. The quantitative changes in anorectal reflex function in the newborn are thought to be related to the state of physiological "constipation," which exists *in utero* and in the early neonatal period. The results indicate that a normal response pattern can be obtained in healthy babies after the first day of life. Consequently, anorectal manometry will be meaningful as a diagnostic method thereafter in the neonatal period. It is suggested that measurement of the stimulus and the response will add useful information and reduce subjective error in interpretation of results.

4319 SOMATOSTATIN INHIBITS GASTRIC MOTILITY IN RESPONSE TO DISTENTION. (Eng.) Stadaas, J. O.; Schrumpf, E.; Hanssen, K. F. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 13(2): 145-148; 1978.

The effect of somatostatin on gastric motility was studied in six healthy volunteers before and after stepwise gastric distention. Distention was performed by filling a flaccid thin-walled bag, which was connected with a low pressure transducer for measuring intragastric pressure variations. Stepwise increase in gastric volume from 0-600 ml caused graded increases in gastric motility. No significant change was seen in the plasma gastrin level. When gastric distention was performed concomitantly with constant infusion of somatostatin (0.05 mg/hr or 0.50 mg/hr) in the same individuals on different days, motility was significantly reduced ($p<0.05$) with both doses of somatostatin, without any changes in the plasma gastrin concentration. It is concluded that somatostatin may have a physiological effect in the regulation of gastric motility. This effect of somatostatin on motility seems to be independent of any effect on the gastrin concentration.

4320 ALPHA-EXCITATORY AND BETA-INHIBITORY ADRENERGIC RECEPTORS IN DUODENAL SMOOTH MUSCLE [Abstract]. (Eng.) Faulk, D. L.; Anuras, S.; Christensen, J. (Univ. Iowa Hosp., Iowa City, IA). *Clin. Res.* 25(4):571A; 1977.

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4322 CORRELATION BETWEEN MYOGENIC TENSION AND O_2 CONSUMPTION IN LOWER ESOPHAGEAL SPHINCTER (LES) OF OPOSSUM [Abstract]. (Eng.) Crane, S.; Schulze, K.; Christensen, J.; McKinley, D. (Coll. Medicine, Univ. Iowa, Iowa City, IA). *Clin. Res.* 25(4):570A; 1977.

4323 SOMATOSTATIN (GHRIH) INHIBITION OF HORMONALLY INDUCED INCREASES IN LOWER ESOPHAGEAL SPHINCTER PRESSURE (LESP) [Abstract]. (Eng.) Bybee, D. E.; Brown, F. C.; Georges, L. P.; Castell, D. O.; McGuigan, J. E. (Natl. Naval Medical Center, Bethesda, MD). *Clin. Res.* 25(4): 570A; 1977.

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M.; McCallum, R. W. (Wadsworth Veterans Admin. Hosp., Los Angeles, CA). *Clin. Res.* 25(4):569A; 1977.

4325 SIMULTANEOUS STUDY OF HUMAN ANTRODUODENAL MOTILITY, GASTRIC EMPTYING AND DUODENOGASTRIC REFLUX [Abstract]. (Eng.) Rees, W. D. W.; Go, V. L. W.; Malagelada, J. R. (Mayo Clinic, Rochester, MN). *Clin. Res.* 25(4):608A; 1977.

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4339 ELECTRICAL AND MOTOR ACTIVITY OF THE SURGICALLY ALTERED GASTRODUODENAL JUNCTION OF THE DOG [Abstract]. (Eng.) Gullikson, G. W.; Okuda, H.; Bass, P. (Univ. Wisconsin, Madison, WI 53706). *Fed. Proc.* 37(3):228; 1978.

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4341 EFFECT OF SYMPATHETIC NERVE STIMULATION ON ESOPHAGEAL FUNCTION [Abstract]. (Eng.) Fournet, J.; Snape, W. J., Jr.; Cohen, S. (Univ. Pennsylvania, Philadelphia, PA 19104). *Fed. Proc.* 37(3):228; 1978.

4342 INTESTINAL CONTRACTIONS DUE TO HEXAMETHONIUM OR ATROPINE AS EVIDENCE FOR INTRAMURAL INHIBITORY NEURONS [Abstract]. (Eng.) Frank, M. H. (New York Medical Coll., Valhalla, NY 10595). *Fed. Proc.* 37(3):227; 1978.

4343 EXCITATORY ACTION OF SEROTONIN ON SOMAL MEMBRANES OF MYENTERIC NEURONS OF GUINEA PIG SMALL BOWEL [Abstract]. (Eng.) Mayer, C. J.; Wood, J. D. (Dept. Physiology, Univ. Munich, 8 Munich 2, W. Germany). *Fed. Proc.* 37(3):227; 1978.

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See also, 4290, 4304, 4541, 4548, 4583, 4591, 4682.

SECRETION AND METABOLISM

4345 EFFECTS OF K^+ AND ACETYLCHOLINE ON THE OXYGEN UPTAKE IN SUBMANDIBULAR GLAND TISSUES. (Eng.) Komabayashi, T.; Sakamoto, S.; Endoh, S.; Tsuboi, M. (Tokyo Coll. Pharmacy, Tokyo, Japan). *Jikeikai Med. J.* 24(4):281-288; 1977.

4346 INTRACELLULAR DISTRIBUTIONS AND DEVELOPMENTAL CHANGES OF ADENYLATE KINASE ACTIVITY IN SALIVARY GLANDS OF LABORATORY ANIMALS. (Eng.) Doi, N.; Oyama, S.; Tanaka, H.; Furuyama, S. (Nihon Univ. Sch. Dentistry at Matsudo, 2-870-1, Sakaecho-nishi, Matsudo City, Chiba, Japan). *Comp. Biochem. Physiol.* 59B:21-24; 1978.

4347 THE INTERACTION OF LIVER AND KIDNEY IN VITAMIN B_{12} HOMEOSTASIS IN THE RAT [Abstract]. (Eng.) Bullock, J.; Cooksley, G. (Dept. Biochemistry, Univ. Queensland, Brisbane, Australia). *Clin. Exp. Pharmacol. Physiol.* 4(5):481-482; 1977.

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4349 AGE-RELATED CHANGES IN COURSE OF RESTITUTION OF SECRETORY MATERIAL IN RAT SUBMANDIBULAR GLAND STIMULATED WITH ISOPROTERENOL. (Eng.) Mysliwski, A. (Medical Sch., 80-210 Gdansk, Poland). *Exp. Gerontol.* 12(3/4):81-87; 1977.

See also, 4509, 4537, 4538, 4701, 5022.

SECRETION AND METABOLISM

Stomach

4350 PLASMA GASTRIN AND GASTRIC SECRETORY RESPONSE TO DUODENAL PERFUSION WITH LIVER EXTRACT IN HEALTHY HUMAN SUBJECTS. (Eng.) Grabner, P.; Semb, L. S.; Schrumpf, E.; Myren, J. (Diakonhjemmets Hosp., Oslo 3, Norway). *Scand. J. Gastroenterol.* 12(7):865-868; 1977.

The responses of plasma gastrin and gastric secretion were determined in eight healthy subjects during duodenal perfusion with liver extract (LE). After a 1-hr period without perfusion, the duodenum was perfused for 2 hr with 15% LE (pH 4.5-5.5, 1,027 mOsm/kg water) at a rate of 100 ml/hr, either alone or in combination with i.v. infusion of different doses of exogenous pentagastrin (0.1 μg/kg during the first hour, 3 μg/kg during the second hour). Reflux to the stomach was monitored by addition of radioactive B_{12} to the perfusates. During perfusion of the proximal duodenum in six subjects, in whom reflux of the perfusates was less than 4%, only a slight and inconstant change in plasma gastrin was seen. Gastric acid and pepsin outputs were increased to about 18% and 25% of the maximal pentagastrin stimulation, resp. Although 15% LE was shown to release gastrin by antral perfusion, such release was not found by duodenal perfusion, except where reflux to the antrum was seen. The results suggest that intestinal stimulation of gastric secretion exists, but that it is not gastrin dependent.

4351 HEPATIC INACTIVATION OF GASTRINS OF VARIOUS CHAIN LENGTHS IN DOGS. (Eng.)

Strunz, U. T.; Thompson, M. R.; Elashoff, J.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 74(3):550-553; 1978.

Acid secretion in response to portal or systemic venous infusion of a series of progressively longer fragments of the carboxyl terminal portion of human gastrin was studied in dogs with gastric fistulae and with transposition of the portal vein and the inferior vena cava. Pentagastrin G6, G7, G8, G9, G10, G13, G17, and G34 were studied. Potency by portal venous infusion relative to systemic venous infusion was used as an index of hepatic inactivation. Fragments with eight or fewer amino acid residues were more than 90% inactivated by hepatic transit. Fragments with nine or more amino acid residues were more resistant to hepatic inactivation than were shorter fragments. For fragments with 7 to 17 amino acid residues, increasing the chain length was accompanied by progressive increase both in hepatic resistance to inactivation and in potency for stimulation of acid secretion, suggesting that resistance to hepatic inactivation may be a major determinant of potency.

4352 THE ROLE OF ADRENALINE AND OF THE VAGUS IN GASTRIN RELEASE AND ACID SECRETION IN DOGS. (Eng.)

Brandsborg, O.; Ornshot, J.; Brandsborg, M.; Christensen, N. J. (Kommunehospitalet, DK-8000 Aarhus C, Denmark). *Eur. J. Clin. Invest.* 7(6):481-486; 1977.

To study the role of epinephrine and of the vagus in gastrin release and acid secretion, serum gastrin levels, gastric acid secretion, and plasma epinephrine levels were measured in response to the i.v. injection of 2-deoxy-D-glucose (100 mg/kg) or insulin (0.25 IU/kg) in six dogs with gastric fistulae before and after denervation of the antrum and the intestine (antral-intestinal vagotomy). The same six dogs were also studied pre- and postoperatively in the basal state and after a 200-g beef meal of standard dog food. Serum gastrin levels and gastric acid secretion were also measured in four of the same dogs during the i.v. infusion of epinephrine (2, 4, 6, or 8 μg/min) in doses that produced an elevation of plasma epinephrine to levels occurring during hypoglycemia or after the injection of 2-deoxy-D-glucose. Antral-intestinal vagotomy reduced the basal gastrin concentration slightly and basal gastric acid secretion considerably ($p<0.05$); the rise in serum gastrin in response to 2-deoxy-D-glucose and hypoglycemia was abolished, while the increase in gastric acid secretion was reduced. Beef meal-stimulated gastrin secretion was the same before and after vagotomy. The i.v. infusion of epinephrine had no effect on either serum gastrin concentration or gastric acid secretion. It is concluded that, in the dog, in contrast to man, gastrin release after insulin is dependent on an intact vagus. Gastrin release by epinephrine in the dog does not appear to be physiological since it is not achieved by the amount of epinephrine released in response to hypoglycemia.

4353 ROLE OF GASTRIN HEPTADECAPEPTIDE IN THE ACID SECRETORY RESPONSE TO AMINO ACIDS IN MAN. (Eng.)

Feldman, M.; Walsh, J. H.; Wong, H. C.; Richardson, C. T. (Veterans Admin. Hosp., Dallas, TX 75216). *J. Clin. Invest.* 61(2):308-313; 1978.

The relation between gastrin release and acid secretory response was studied in eight healthy subjects. An isotonic mixed amino acid solution (casein hydrolysate) was continuously infused into the stomach of each subject. Acid secretion, measured by *in vivo* intragastric titration, increased 12.8 mEq/hr over the response to intragastric infusion of isotonic saline. Plasma gastrin heptadecapeptide (G-17) concentration, measured by specific radioimmunoassay, increased 13 pM during intragastric amino acid infusion. To determine whether this rise in plasma G-17 concentration could account for some or all of the acid secretory response, several doses of synthetic human G-17-I (4.0, 10.0, 25.0, and 62.5 pmol/kg/hr) were infused i.v. into the same subjects. During this infusion, the stomach was continuously infused with isotonic saline. By graphically relating plasma G-17 concentration during i.v. G-17 infusion to concomitant acid secretion, it was determined that a 13-pM rise in plasma G-17 concentration could increase acid secretion 14.8 mEq/hr. Therefore, the rise in plasma G-17 concentration during intragastric amino acid infusion could have produced all of the observed acid secretory response. This suggests that gastrin heptadecapeptide is the major physiologic mediator of the human acid secretory response to meals containing mixed amino acids.

4354 MACROMOLECULAR SECRETION BY ISOLATED GASTRIC MUCOSA: FUNDAMENTAL DIFFERENCES IN PEPSINOGEN AND INTRINSIC FACTOR SECRETION. (Eng.)

Kapadia, C. R.; Donaldson, R. M., Jr. (Veterans Admin. Hosp., West Haven, CT 06516). *Gastroenterology* 74(3):535-539; 1978.

The secretion of pepsinogen and intrinsic factor (IF) in response to various known stimulators and inhibitors of gastric acid secretion was examined in isolated rabbit gastric mucosa maintained in organ culture. Acetylcholine (10^{-8} M) stimulated both pepsinogen ($p<0.01$) and IF ($p<0.01$) secretion, and this stimulation was blocked by atropine (10^{-2} M). Parasympatholytic agents did not alter unstimulated (basal) secretion of pepsinogen even at high concentrations (atropine, 10^{-2} M or propantheline bromide, 5×10^{-3} M); however, at these concentrations basal IF secretion was abolished. Histamine (10^{-4} and 10^{-2} M) had no effect on pepsinogen secretion but stimulated IF secretion ($p<0.001$). Cimetidine (2×10^{-3} M) reduced both basal and histamine-stimulated IF secretion (by 42%

and 100%, resp.), but pepsinogen secretion remained unaltered. The gastric mucosal surface was not exposed to HCl but was constantly buffered by culture medium at pH 7.4. When 50 mN HCl was applied to the mucosal surface of the biopsies, pepsinogen secretion doubled ($p<0.001$), but IF secretion was abolished. These studies document that fundamental differences exist in the responses of pepsin- and IF-secreting cells and that H^+ ions bathing the mucosal surface of the stomach may influence the results of experiments designed to examine the mechanisms of gastric mucosal macromolecular secretion.

4355 PROTEIN SYNTHESIS INHIBITORS AND GASTRIC ACID SECRETION.

(Eng.) Carlisle, K. S.; Reagan, C. R.; Hersey, S. J. (Emory Univ., Atlanta, GA 30322). *Gastroenterology* 74(3):504-510; 1978.

The involvement of *de novo* protein synthesis in acid secretion by the *in vitro* bullfrog gastric mucosa was examined using the inhibitors cycloheximide (5 µg/ml) and puromycin (80 µg/ml). Both inhibitors reduced ^3H-leucine incorporation by more than 90%. The inhibition of protein synthesis had no influence on spontaneous acid secretion, nor did it affect secretory stimulation by histamine, carbachol, pentagastrin, or theophylline. Oxygen consumption by nonstimulated and theophylline-stimulated tissues was shown to be independent of protein synthesis. The dramatic morphological changes observed in oxyntic cells during a transition from rest to active secretion persisted in cycloheximide- and puromycin-treated tissues. Stereological analysis of the apical membrane surface area density failed to demonstrate any quantitative influence of protein synthesis inhibition. These studies quantitatively confirm that protein synthesis is not required for the biochemical and morphological events involved in acid secretion by the *in vitro* frog gastric mucosa.

4356 THE ACTIONS OF SECRETAGOGUES ON OXYGEN UPTAKE BY ISOLATED MAMMALIAN PARIETAL CELLS.

(Eng.) Soll, A. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *J. Clin. Invest.* 61(2):370-380; 1978.

The action of histamine, carbamylcholine, and gastrin on oxygen uptake by canine fundic mucosal cells was studied *in vitro*. Viable mucosal cells were prepared by exposure of separated mucosa sequentially to collagenase and EDTA. Oxygen consumption, determined by polarography, was chosen as an index of physiological response of mucosal cells to secretagogues. Isobutyl methyl xanthine (IMX), carbamylcholine, histamine, and gastrin each independently stimulated oxygen uptake by the unfractionated mucosal cells. The response to histamine was greatly enhanced when 0.1 mM IMX was present. In fractions of varying parietal cell content obtained with the Beckman elutriator rotor, basal and stimulated oxygen uptake correlated with the parietal cell content of the fractions. The percentage increases in oxygen uptake in response to histamine, gastrin, carbamylcholine, and IMX were similar in enriched fractions with from 50% to 85% parietal cells and in unenriched starting fractions. The normalized dose-response relations for histamine with an IMX background and for carbamylcholine were also similar in these two fractions. The specificity of these responses was tested using metiamide and atropine. Neither metiamide (0.1 mM) nor atropine (10 µM) inhibited basal oxygen uptake. Histamine, studied with an IMX background, was inhibited by metiamide but not by atropine, while carbamylcholine was inhibited by atropine but not by metiamide. Neither metiamide nor atropine inhibited gastrin-stimulated oxygen uptake. These data indicate that in this *in vitro* system, parietal cells account for most of the increase in oxygen uptake produced by exposure to gastric secretagogues and that histamine, gastrin, and carbamylcholine each independently stimulate oxygen uptake by the parietal cell. The specificity displayed by atropine and metiamide in this system suggests that the parietal cell has specific receptors for each of these secretagogues.

4357 THE INTERACTION OF HISTAMINE WITH GASTRIN AND CARBAMYLCHOLINE ON OXYGEN UPTAKE BY ISOLATED MAMMALIAN PARIETAL CELLS.

(Eng.) Soll, A. H. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *J. Clin. Invest.* 61(2):381-389; 1978.

The interactions between histamine and gastrin and between histamine and carbamylcholine and the effects of atropine and metiamide on these interactions were studied, using oxygen uptake as an index of the physiological response of isolated parietal cells. Parietal cells were isolated from canine fundic mucosa by sequential exposure of separated mucosa to collagenase and EDTA. Potentiating interactions between histamine and carbamylcholine and between histamine and gastrin were demonstrated. Against a histamine (0.1 and 1 µM) plus isobutyl methyl xanthine (0.1 mM) background, the dose for 50% response for gastrin was approximately 1 nM, and the maximal response was obtained at 0.1 µM. When added to these combinations of stimulants, metiamide and atropine retained their respective specificities against stimulation by histamine and carbamylcholine, in that responses were inhibited to the level that was seen when the component of the pair that was not inhibited was given alone. The observation that histamine plus gastrin and histamine plus carbamylcholine produce maximal responses that are greater than the maximal response to histamine alone supports the hypothesis that these agents each have direct actions on parietal cells. These observations are not consistent with the hypothesis that histamine is the sole mediator for the effects of other secretagogues. Furthermore, the inhibitory effects of atropine and metiamide on the specific cholinergic and histaminic components of the interactions that occur between secretagogues provide a possible explanation for the apparent lack of specificity of these agents on *in vivo* acid secretion.

4358 HISTAMINE AUGMENTS GASTRIC ULCERATION PRODUCED BY INTRAVENOUS ASPIRIN IN CATS.

(Eng.) Hansen, D. G.; Aures, D.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 74(3):540-543; 1978.

Studies were carried out in conscious cats to determine whether the addition of histamine to the i.v. infusion of aspirin would produce more severe ulcers and cause them to appear earlier. A continuous infusion of aspirin (0.063-4.0 mg/kg/hr) for 36 hr did not produce gastric ulcers when given alone but did when combined with histamine-2HCl (160 μg/kg/hr, i.v.). The ulcers were mainly antral in location. The incidence and severity of ulcers increased with duration of the infusion up to 36 hr and with dose of aspirin up to 4 mg/kg/hr. With the highest doses and longest durations, some of the antral ulcers perforated. Antral ulcers occurred in more than half of the cats receiving 0.25 mg/kg/hr or more of aspirin for 36 hr or receiving 4 mg/kg/hr of aspirin for ≥6 hr. Intravenous aspirin plus the intragastric infusion of 150 mM HCl (40 ml/hr) for 16 hr also produced gastric ulcers. Plasma salicylate concentrations were less than 350 μg/ml with all doses and durations of aspirin used (400 μg/ml is regarded as the upper limit of the therapeutic range in man). These studies show that when the stomach is acidified by giving histamine i.v. or HCl intragastrically, i.v. aspirin produces large deep gastric ulcers.

4359 EFFECT OF MAST CELL DEGRANULATION ON GASTRIC MUCOSAL DAMAGE PRODUCED BY SODIUM TAUROCHOLATE IN THE RAT.

(Eng.) Rees, W. D. W.; Rhodes, J.; Williams, B. C.; Owen, E.; Newcombe, R. G. (Mayo Clinic, Rochester, MN). *Gastroenterology* 74(3):492-495; 1978.

The source of the histamine released during damage to the gastric mucosa was investigated in rats using perfused total gastric pouches. Two groups of rats were treated with either i.p. normal saline or compound 48/80, an agent that produces mast cell degranulation, over a 5-day period (100 μg on the first day, increasing by daily increments of 100 μg to 500 μg on the fifth day). On the fifth day, total gastric pouches were prepared and connected to a perfusion circuit that enabled a 20-ml volume to be circulated through the pouches. The experiments consisted of three 30-min periods during which transmucosal potential difference was monitored and ionic (hydrogen and sodium) flux was measured; standard acid solution was used in the first two periods and a taurocholate solution in the third. Sodium taurocholate produced a significant increase in ionic flux and fall in the potential difference ($p<0.001$), the magnitude of the changes being similar in the 48/80- and saline-treated groups. Histamine was released from the mucosa in significantly greater amounts ($p<0.001$) during the taurocholate period, and the increase was similar in both groups of rats. Histological examination of the stomachs confirmed mast cell degranulation in the 48/80-treated groups. It is concluded that the histamine released during mucosal damage is probably derived from the "nonmast cell pool" and that this histamine may play a role in mediating the mucosal damage.

4360 EFFECTS OF STRESS AND HIGHLY SELECTIVE VAGOTOMY ON MAST CELLS IN THE WALL OF THE RAT STOMACH.

(Fre.) Forgacs, A.; Patricio, J.; Duchatelle, J. P.; Germain, M. (Centre d'experimentation animale, Universite Paris XII, 6, rue du General-Sarrail, 94000 Creteil, France). *J. Chir. (Paris)* 114(3):225-231; 1977.

The effects of immobilization stress and highly selective vagotomy (HSV) on the number and appearance of mast cells of the gastric wall, visualized by Alcian Blue-Safranin staining, were studied in 70 adult male Wistar rats. Group 1 (10 rats) served as control. Group 2 (15 rats) was subjected to 24-hr stress. Group 3 (30 rats) underwent HSV and group 4 (15 rats) was stressed 40 days after HSV. HSV alone caused a significant increase in the mast cell count ($p=0.001$) during the 6-month observation period. Stress caused ulcers in 94.6% of all rats that did not undergo HSV; the overall mast cell count showed no significant change compared with the controls, but the red-staining mast cells disappeared. Stress after HSV caused ulcer in 26.7% of the rats; the total number of mast cells diminished compared with the nonstressed, vagotomized rats (17.9 cells/mm^2 versus 238 cells/mm^2), but the percentage of blue-staining mast cells increased from 41.2% to 86.6%, and the percentage of the red-staining mast cells dropped from 44.4% to 3.9%. The findings indicate that the vagus nerve influences the mast cell count in the gastric wall and regulates the ratio of red-staining to blue-staining mast cells. Stress leads to the disappearance of red-staining mast cells, which may be independent of the vagal innervation. The long-term consequences of HSV should be further studied.

4361 ENDOCRINE CONTROL OF DNA SYNTHESIS IN RAT GASTROINTESTINAL MUCOSA [Abstract].

(Eng.) Enochs, M. R.; Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2): 1055; 1977.

4362 EFFECTS OF GASTRIN AND VAGOTOMY ON DNA SYNTHESIS IN CANINE FUNDIC MUCOSA [Abstract].

(Eng.) Ryan, G. P.; Copeland, E. M.; Johnson, L. R. (Univ. Texas Medical Sch., Houston, TX). *Gastroenterology* 72(5, Part 2):1124; 1977.

4363 GASTRIN SECRETORY RESPONSE TO EXOGENOUS AND ENDOGENOUS CYCLIC NUCLEOTIDES IN ANTRAL ORGAN CULTURE [Abstract].

(Eng.) Harty, R. F.; McGuigan, J. E. (Univ. Florida Coll. Medicine, Gainesville, FL). *Gastroenterology* 72(5, Part 2):1068; 1977.

4364 A CHRONIC GASTROSTOMY AND TEST SYSTEM FOR EVALUATION OF GASTRIC SECRETIONS IN RHESUS MONKEYS [Abstract]. (Eng.) Houghton, P. W.; Jones, D. C. L. (Life Sciences Div., Stanford Res. Inst., Menlo Park, CA). *Gastroenterology* 72 (5, Part 2):1072; 1977.

4365 THE 2-DEOXY-D-GLUCOSE-NEUTRAL RED TEST AND VAGOTOMY. AN EXPERIMENTAL STUDY. (Eng.) Van Rensburg, L. C. J. (828 Medipark, Foreshore, Cape Town, South Africa). *S. Afr. Med. J.* 52(11):447-450; 1977.

4366 THE ROLE OF MAST CELLS IN THE PATHOGENESIS OF RAT GASTRIC MUCOSAL DAMAGE [Abstract]. (Eng.) Rees, W. D. W.; Rhodes, J.; Owen, E. M. (Univ. Hosp. Wales, Cardiff, Wales). *Gastroenterology* 72(5, Part 2):1118; 1977.

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4368 PEPSINOGEN SECRETION IN HIBERNATING AND NON-HIBERNATING FROGS--EFFECTS OF SECRETAGOGUE AND cAMP [Abstract]. (Eng.) Goldenberg, D. J.; Simpson, L.; Hirschowitz, B. I. (Div. Gastroenterology, Univ. Alabama in Birmingham, Birmingham, AL 35294). *Gastroenterology* 72(5, Part 2); 1977.

4369 INTRAVENOUS INFUSION OF AMINO ACIDS STIMULATES GASTRIC ACID SECRETION IN MAN [Abstract]. (Eng.) Isenberg, J. I.; Maxwell, V. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1074; 1977.

4370 INHIBITION OF GASTRIC H-ION SECRETION IN DOG AND MAN BY A LOCAL ANESTHETIC USV 64-105 [Abstract]. (Eng.) Romano, D.; Cervoni, P.; Muslim, A.; Plansky, R.; Pellecchia, C.; Berkowitz, J. M. (Res. Lab., USV-Pharmaceutical, Tuckahoe, NY). *Gastroenterology* 72(5, Part 2):1122; 1977.

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4372 EFFECT OF GLUCAGON ON ASPIRIN-INDUCED GASTRIC MUCOSAL DAMAGE IN MAN [Abstract]. (Eng.) Tarnawski, A.; Ivey, K. J.; Krause, W.; Baskin, W. N. (Veterans Admin. Hosp., Columbia, MO). *Clin. Res.* 25(3):276A; 1977.

4373 COMPARATIVE EFFECTS OF D-PENICILLAMINE, ASPIRIN, KETOPROFEN AND IBUPROFEN ON GASTRIC MUCOSA [Abstract]. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1094; 1977.

4374 ASPIRIN AND COLCHICINE INDUCED ACUTE EROSIVE GASTRITIS: ITS PREVENTION BY METIAMIDE AND CIMETIDINE [Abstract]. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Gastroenterology* 72(5, Part 2):1094; 1977.

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4378 CIMETIDINE AND SALBUTAMOL COMBINED INHIBITION OF GASTRIC ACID [Abstract]. (Eng.) McCloy, R. F.; Parmenter, S. C.; Baron, J. H. (Royal Postgraduate Medical Sch., Hammersmith Hosp., London, England). *Gut* 18(5):A404-A405; 1977.

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4380 CIMETIDINE AND PROSTAGLANDINS: EVIDENCE FOR DIFFERENT MODES OF ACTION ON THE GASTRIC MUCOSA [Abstract]. (Eng.) Carmichael, H. A.; Nelson, L. M.; Russell, R. I. (Royal Infirmary, Glasgow, Scotland). *Gut* 18(5):A404; 1977.

4381 INHIBITORY EFFECT OF CYCLOHEXIMIDE ON GASTRIC SECRETION IN RATS. (Eng.) Korbova, L.; Kohout, J.; Cizkova, J.; Cihak, A. (First Surgery Clinic, Charles Univ., Prague 2, Czechoslovakia). *Biochem. Pharmacol.* 26(10):979-981; 1977.

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(Eng.) Robert, A.; Nezamis, J. E.; Lancaster, C. (Dept. Experimental Biology, Upjohn Co., Kalamazoo, MI). *Gastroenterology* 72(5, Part 2):1121; 1977.

4383 GLUCOSE-INDUCED SUPPRESSION OF MEAL-STIMULATED GASTRIN RELEASE IN DOGS: RELATION TO GASTRIC INHIBITORY POPYPEPTIDE (GIP) [Abstract]. (Eng.) Baumert, J.; Cataland, S.; Tetirick, C.; Pace, W.; Mazzaferri, E. (Dept. Medicine, Ohio State Univ., Columbus, OH). *Clin. Res.* 25(3):306A; 1977.

4384 THE EFFECT OF TWO INHIBITORS OF HISTIDINE DECARBOXYLASE ON GASTRIC SECRETION IN THE RAT. (Eng.) Megazzini, P.; Bacciarelli, C. (Istituto Farmacobiologico Malesci, Via Paisiello 8, Firenze, Italy). *Drug. Res.* 27(I, 3):620-623; 1977.

4385 HISTOCHEMICAL AND BIOCHEMICAL OBSERVATIONS OF BIOGENIC AMINES IN EXPERIMENTAL ULCER OF RAT. (Eng.) Kishimoto, S.; Hoshida, S.; Miyoshi, A. (Hiroshima Univ. Medical Sch., 1-2-3 Kasumicho, Hiroshima 734, Japan). *Acta Histochem. Cytochem.* 10(1):87-93; 1977.

4386 HISTAMINE H-2 STIMULATION AND INHIBITION OF PEPSIN SECRETION IN THE FISTULA DOG [Abstract]. (Eng.) Hirschowitz, B. I.; Hutchison, G. (Univ. Alabama Medical Sch., Birmingham, AL 35294). *Gastroenterology* 72(5, Part 2):1069; 1977.

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4388 REGULATION OF THE NON-MAST CELL HISTAMINE LEVEL WITH SPECIAL REFERENCE TO THE GASTRIC HISTAMINE [Abstract]. (Eng.) Huszti, Z. (Res. Inst. Pharmaceutical Chemistry, Budapest, Hungary). *Agents Actions* 71(1):113; 1977.

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4390 GASTRIC CYTOPROTECTIVE PROPERTY OF PROSTAGLANDINS [Abstract]. (Eng.) Robert, A.; Nezamis. J. E.; Lancaster, C.; Hanchar, A. J. (Dept. Experimental Biology, Upjohn Co., Kalamazoo, MI). *Gastroenterology* 72(5, Part 2):1121; 1977.

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4392 STIMULATION OF ANTRAL GASTRIN RELEASE AND GASTRIC ACID SECRETION BY TAUROCHOLIC ACID [Abstract]. (Eng.) McGuigan, J. E.; Sekine, T.; Woodward, E. R. (Univ. Florida Coll. Medicine, Gainesville, FL). *Gastroenterology* 72(5, Part 2): 1100; 1977.

4393 SERIAL pH CHANGES IN THE PROXIMAL DUODENUM DURING SMOKING (S) [Abstract]. (Eng.) Murthy, S. N. S.; Dinoso, V. P.; Clearfield, H. R. (Hahnemann Medical Coll., Philadelphia, PA 19102). *Gastroenterology* 72(5, Part 2):1106; 1977.

4394 INCREASE IN GASTRIN CONCENTRATION IN THE DUODENAL MUCOSA OF DOGS FOLLOWING RESECTION OF THE GASTRIC ANTRUM. (Eng.) Nilsson, G.; Brodin, K. (Dept. Pharmacology, Karolinska Inst., Stockholm, Sweden). *Acta Physiol. Scand.* 99(4): 510-512; 1977.

4395 SERUM GASTRIN LEVELS DURING PREGNANCY [Abstract]. (Eng.) Albano, O.; Francavilla, A.; Pansini, F.; Mollica, G.; Restaino, A.; Bettocchi, S. (Istituto di Semeiotica Medica, Universita degli Studi, Bari, Italy). *Rend. Gastroenterol.* 9(1):67; 1977.

4396 CANINE GASTRIC ULCER HEALING AFTER LASER PHOTOTHERAPY [Abstract]. (Eng.) Dwyer, R. M.; Fisher, S. D.; Lechago, J.; Wise, P.; Bass, M. (Harbor General Hosp., Torrance, CA). *Gastroenterology* 72(5, Part 2):1054; 1977.

4397 PATHOGENESIS OF EXPERIMENTAL AMPHIBIAN GASTRIC ULCERATIONS [Abstract]. (Eng.) Crass, R. A.; Halpern, N. B.; Graper, W. P.; Silen, W. (Harvard Medical Sch., Boston, MA 02215). *Gastroenterology* 72(5, Part 2):1041; 1977.

4398 MUCOSAL ATP CONTENT DURING ACUTE MUCOSAL ULCEROGENESIS [Abstract]. (Eng.) Ritchie,

W. P., Jr.; Schneider, J.; Shearburn, E. W., III (Univ. Virginia Medical Center, Charlottesville, VA 22901). *Gastroenterology* 72(5, Part 2):1120; 1977.

4399 TROPHIC EFFECTS OF CHRONIC HYPERGASTRINEMIA IN THE RAT [Abstract]. (Eng.) Deveney, C. W.; Deveney, K. S.; Reber, H. A.; Way, L. W. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1048; 1977.

4400 GIANT HYPERTROPHIC GASTRITIS OF BASENJI DOGS. (Eng.) Van Kruiningen, H. J. (Dept. Pathobiology, Univ. Connecticut, Storrs, CT 06268). *Vet. Pathol.* 14(1):19-28; 1977.

See also, 4287, 4288, 4292, 4293, 4294, 4329, 4331, 4415, 4501, 4529, 4538, 4541, 4553, 4597, 4662, 4665, 4666, 4671, 4673, 4675, 4678, 4679, 4680, 4689, 4693, 4694, 4695, 4696, 4697, 5036.

SECRETION AND METABOLISM

Pancreas

4401 STUDIES ON THE SECRETORY PROCESS IN EXOCRINE PANCREAS CELLS II. C57 BLACK AND BEIGE MICE. (Eng.) Novikoff, A. B.; Quintana, N.; Mori, M. (Albert Einstein Coll. Medicine, Yeshiva Univ., Bronx, NY). *J. Histochem. Cytochem.* 26(2): 83-93; 1978.

Electron microscopic and cytochemical studies were performed on the pancreas of the C57 black mouse and its beige mutant (an animal homologue of the Chediak-Higashi syndrome) to determine whether the packaging of secretory materials occurs in GERL, an area of endoplasmic reticulum (ER) that displays acid phosphatase (AcPase) but not thiamine pyrophosphatase (TPPase) activity and from which lysosomes appear to form. In the black mouse, electron microscopy revealed that the GERL includes condensing vacuoles, coated vesicles, and rigid lamellae. The rough ER extends to GERL through gaps between Golgi stacks. Electron-opaque materials were not encountered, either in GERL or in other areas of ER. In the beige mouse, electron microscopy demonstrated that most of the GERL appears to consist of wide dilated portions filled with electron-opaque materials that seem to be packaged into huge residual body-type lysosomes. This GERL also showed AcPase-positive condensing vacuoles, rigid lamellae, and coated vesicles. In the beige mouse, therefore, processing and packaging of secretory materials apparently continue normally despite the formation of abnormal granules of GERL. The studies reported here establish that GERL can be specialized into different regions in the pancreatic acinar cell and extend the concept of the complexity of transport within the ER.

4402 CHANGES IN PANCREATIC AND INTESTINAL ENZYME ACTIVITIES FOLLOWING CHENODEOXYCHOLIC ACID FEEDING. (Eng.) O'Donnell, M. D.; Fitzgerald, O.; McGeeney, K. F. (Dept. Medicine and Therapeutics, Univ. Coll., "Woodview," Stillogran Rd., Dublin 4, Ireland). *Scand. J. Gastroenterol.* 12(6): 683-687; 1977.

The effect of p.o. chenodeoxycholic acid (CDCA) on pancreatic and intestinal enzyme levels was examined by feeding 0.5% CDCA in a normal diet to male mice (inbred bca strain). Groups of eight mice each were killed on days 3, 23, and 70 after the start of CDCA feeding. Pancreatic lipase concentration and specific activity were significantly increased after 3 days and 70 days ($p<0.0005$ and $p<0.01$) on the CDCA-containing diet but not at 23 days. Amylase and trypsin activities per gram of pancreas were significantly higher at 23 days ($p<0.05$ for both) and 70 days ($p<0.01$ and $p<0.05$, resp.) on the diet compared to controls. Expressed as specific activities (U/mg protein) the difference between the experimental and control groups is significant only at 70 days ($p<0.025$) with respect to amylase and is not significant with respect to trypsin. Pancreatic protein concentration was significantly increased at 3 and at 70 days ($p<0.005$ and $p<0.01$, resp.) but not at 23 days compared to controls; the intestinal protein concentration was significantly higher only after 70 days ($p<0.05$). Intestinal amylase levels did not change during the experiments. Intestinal α-glucosidase activity was significantly increased after 3 days, expressed either as concentration ($p<0.0005$) or as specific activity ($p<0.0025$). However, at 70 days on the CDCA-containing diet, the difference was significant ($p<0.02$) only when expressed as a concentration; the difference was never significant when expressed as a specific activity. The increase in the digestive enzyme concentration of the pancreas caused by CDCA feeding is somewhat similar to the effect of feeding soybean trypsin inhibitors. The higher enzyme levels may result from increased synthesis, probably leading to increased secretion of enzymes.

4403 THE ACTION OF BOMBESIN AND LITORIN ON PANCREATIC SECRETION OF THE RAT. (Eng.) Linari, G.; Linari, M. B.; Lutoslawska, G. (Istituto di Farmacologia Medica I, Piazzale delle Scienze 5, 00185 Roma, Italy). *Rend. Gastroenterol.* 9(3):179-184; 1977.

The effects of bombesin (BBS) and litorin (LIT) on pancreatic secretion were investigated in anesthesized female Wistar rats and compared with the effect of cerulein (C). Both BBS and LIT strongly stimulated pancreatic flow and amylase output in a dose-dependent manner, with a short latency in the onset of the response. With regard to amylase secretion the threshold dose was 5-10 ng/kg/min for BBS and 15-20 ng/kg/min for LIT. The maximum response of both BBS and LIT was observed at an infusion rate of 303.75 ng/kg/min. Similar responses were obtained with C infused at rates 10 times lower on a weight basis. The calculated maximal responses of amylase output to bombesin and litorin were similar but, on the basis of ED_{50}, bombesin was 36% more potent than LIT. There was a statistically significant correlation (r=0.96) between pancreatic flow and amylase secretion, indicating that no change in amylase concentration occurred during stimulation with either polypeptide. Pancreatic secretion elicited by BBS, LIT, or C was practically unaffected either by atropine administration or by enterectomy. The latter finding makes it unlikely that BBS and LIT act on the rat pancreas through cholecystokinin (CCK) release, unless CCK is released by sites other than the intestine. It is suggested that the effect of BBS and LIT on the rat pancreas is due primarily to direct stimulation of the acinar cell.

4404 THE ACTION OF CAERULEIN ON THE PANCREATIC SECRETION OF THE RAT. (Eng.) Linari, G.; Linari, M. B. (Inst. Medical Pharmacol. I, Univ. Rome, 00185 Rome, Italy). *Farmaco* [*Prat.*] 32(12): 611-616; 1977.

The response of the pancreas to i.v. cerulein was studied in female Wistar rats. Cerulein stimulated both juice flow and amylase output. A good dose-response relationship was obtained for infusion rates of the peptide ranging from 1.25 to 33.75 ng/kg/min. At the rate of 101.25 ng/kg/min, the pancreatic response decreased. The rate of amylase output rapidly increased to 3.75 ng/kg/min, remaining constant thereafter. Atropine (5 mg/kg, 10 min before cerulein; or 30 µg/kg/min, starting 30 min after cerulein infusion) did not appreciably affect the pancreatic response. This study confirms that cerulein is a potent stimulant of pancreatic secretion in the rat.

4405 PANCREATIC ACINAR CELL CHANGES INDUCED BY CAERULEIN, VINBLASTINE, DEUTERIUM OXIDE, AND CYTOCHALASIN B IN VITRO. (Eng.) Stock, C.; Launay, J. F.; Grenier, J. F.; Bauduin, H. (Unite de Recherches 61 de l'INSERM, Avenue Moliere, 67200 Strasbourg, France). *Lab. Invest.* 38(2):157-164; 1978.

To elucidate the possible role of microfilaments and microtubules in secretory processes, the effects of cerulein, vinblastine (VB), deuterium oxide (D_2O), and cytochalasin B upon both the structure and the function of the pancreatic acinar cell were studied *in vitro* using rat pancreatic fragments. Cerulein (10 ng/ml) stimulated the release of enzymes and induced the appearance of numerous exocytotic images at the apical part of the acinar cell. Whereas VB (5×10^{-5} M) and D_2O (55%) inhibited the secretory response to cerulein, they did not affect the general ultrastructure of the acinar cell. Prolonged incubation in the presence of VB provoked the disappearance of microtubules and the massive precipitation of microcrystalline material in all parts of the cytoplasmic space. Numerous microtubules were found in the acinar cell after exposure to D_2O. Although VB and D_2O did not alter the microfilamentous network localized at the apical part of the cell, cytochalasin B (2×10^{-5} M) disrupted it. This drug decreased the number of microvilli projecting into the enlarged acinar lumen. Whether cytochalasin B was used alone or in association with VB or D_2O, it inhibited the secretory response to cerulein and prevented exocytosis. It is suggested that microfilaments act in a later step of the secretory cycle, i.e., exocytosis, than do microtubules.

4406 ENZYME SPECTRUM OF THE EXOCRINE PANCREAS OF VARIOUS SPECIES AND ITS SIGNIFICANCE IN ENZYME SUBSTITUTION THERAPY. (Ger.) Berndt, W.; Maas, R.; Strassner, A. (I. Medizinische Universitatsklinik, Martinistrasse 52, 2000 Hamburg 20, W. Germany). *Therapiewoche* 27(35):6090, 6092, 6095-6098, 6101-6104, 6107; 1977.

The enzyme pattern of the exocrine pancreas of the hog, cattle, sheep, horse, and pike, and the suitability of these enzymes in human enzyme substitution therapy were studied. Considerable species-specific differences were found in the lipase, amylase, trypsin, and chymotrypsin in levels of the pancreas, especially with respect to lipase and amylase. The enzyme pattern of the porcine pancreas, featuring high lipase and amylase levels, was found most similar to that of the human pancreatic juice. Lyophilized porcine pancreatin was found best for enzyme substitution therapy in maldigestion syndrome. The porcine exocrine pancreas enzymes were also similar to the human pancreatic enzymes in terms of their molecular properties (molecular weight, isoelectric point, amino acid composition, and trypsin inhibition by Trasylol, Ovumucoid, and Kunitz pancreas trypsin inhibitor).

4407 IMMUNOCHEMICAL QUANTITATION OF PANCREATIC ENDOPEPTIDASES IN THE INTESTINAL CONTENTS OF GERMFREE AND CONVENTIONAL RATS. (Eng.) Genell, S.; Gustafsson, B. E.; Ohlsson, K. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Scand. J. Gastroenterol.* 12(7):811-820; 1977.

Immunochemical techniques were developed and applied to study the fate of pancreatic endopeptidases in the intestinal canal of conventional and germfree Swedish AGUS-strain rats. Two electrophoretically distinct trypsins and chymotrypsins and an elastase were isolated from Sprague-Dawley rat pancreatic juice and rabbit antisera against these enzymes used in the immunochemical studies. In both types of rat, an anionic trypsin and chymotrypsin were the most abundant and were found in higher concentrations in the distal (trypsin, ≈700 μg/g intestinal contents and ≈1,000 μg/g; chymotrypsin, ≈700 and ≈1,800 μg/g for germfree and conventional rats, resp.) than the proximal small intestine (trypsin, ≈200 μg/g and chymotrypsin, ≈450 μg/g for both conventional and germfree rats). The cecal and fecal concentrations of anionic trypsin were markedly higher in the germfree (≈400 and ≈500 μg/g, resp.) than the conventional rat (<100 μg/g for both). Chymotrypsin was not detected in the large intestine of either type of rat. Immunoreactive elastase concentrations were significantly higher in the distal small intestine than in the proximal small intestine in both conventional and germfree rats. In germfree rats, immunoreactive elastase was higher in the cecum (≈2,000 μg/g intestinal contents) and feces (≈2,200 μg/g) than in the distal small intestine (≈1,400 μg/g). No elastase was demonstrated in the large intestine of conventional rats. The immunoreactive anionic trypsin and elastase in the fecal extracts were of the same molecular size as the native enzymes. These results suggest that the intestinal microflora is important in the degradation of elastase and trypsin, while nonbacterial mechanisms may play a similar role for chymotrypsin.

4408 EFFECT OF GLUCAGON ON CANINE EXOCRINE PANCREATIC SECRETION STIMULATED BY A TEST MEAL.

(Eng.) Singer, M. V.; Tiscornia, O. M.; Mendes de Oliveiro, J. P.; Demol, P.; Levesque, D.; Sarles, H. (Unite de Recherches de Pathologie Digestive, INSERM, 46, Chemin de la Gaye, 13009, Marseille, France). *Can. J. Physiol. Pharmacol.* 56(1):1-6; 1978.

The effect of glucagon on exocrine pancreatic secretion by a test meal was studied in three dogs with a chronic gastric fistula and a modified Thomas duodenal fistula. Glucagon was given by continuous i.v. infusion (5, 10, 15, or 30 μg/kg/hr) before and during a test meal. At each dose level, glucagon significantly reduced the water and electrolyte secretion of the pancreas ($p<0.05$ or $p<0.02$). At 15 and 30 μg/kg/hr, glucagon inhibited protein output (by 70% and 45%, resp.); this effect was absent at lower doses. These findings demonstrate a dose-dependent inhibition by glucagon of the pancreatic bicarbonate and protein response to a meal. Inhibition of bicarbonate output was more sensitive to glucagon than was protein output.

4409 A CONTROLLED TRIAL OF GLUCAGON IN ACUTE EXPERIMENTAL PANCREATITIS IN RATS.

(Eng.) Durr, H. K.; Weihe, W.; Bode, C.; Bode, J. C. (Medizinische Klinik der Philipps Universitat, Mannkopffstr. 1, D-3550 Marburg/Lahn, W. Germany). *Z. Gastroenterol.* 15(12):728-733; 1977.

The usefulness of glucagon in the treatment of acute pancreatitis was studied in 245 rats in which pancreatitis had been induced by retrograde instillation of Na-taurocholate into the pancreatic duct. The mortality rate in animals treated every 6 hr with glucagon (1 mg/kg) after the induction of pancreatitis was 50% as compared to 30% in the controls treated with 0.9% NaCl ($p<0.05$). The mortality rate in animals treated every 6 hr with the same dose of glucagon before the induction of pancreatitis was 36.5% as compared to 28% in the corresponding controls ($p>0.05$). Glucagon in lower doses (0.1-0.5 mg/kg/6 hr) did not alter mortality rates, as compared with animals treated with 0.9% NaCl. A nonlethal form of pancreatitis was induced in 26 rats by pancreatic duct ligation. The injection of glucagon (1 mg/kg) seemed to suppress amylase activities in blood for approximately 1 hr. However, 7 and 9 hr after the induction of pancreatitis, amylase activities were significantly higher in animals treated one or two times with glucagon as compared with those in untreated controls ($p<0.01$ or <0.001). It is concluded that glucagon in the high dose of 1-4 mg/kg/24 hr is useful in the treatment of acute pancreatitis in rats.

4410 FAT NECROSIS--A CAUSE OF PANCREATIC PARENCHYMAL NECROSIS?

(Eng.) Schmidt, H.; Lankisch, P. G. (Medizinische Klinik II, Schwalbacher Str. 62, D-6200 Wiesbaden, W. Germany). *Digestion* 17(1):84-91; 1978.

The pancreatic duct or the interstitial tissue of 34 male Sprague-Dawley rats were injected with 0.35 ml of a triglyceride or a product of lipolysis, namely, oleic acid (13 animals), olive oil (9), mono-olein (6), or paraffin oil (6) to test the effects of substances that are released by necrotic fat cells on the pancreatic parenchyma. The animals were killed 6 or 24 hr later, and the pancreas was removed and fixed for histological examination. Acute pancreatic necrosis with severe edema resulted in 6 hr when oleic acid was injected into the pancreatic duct. Similar, but somewhat less pronounced alterations, were produced by olive oil treatment. After injection of oleic acid into the pancreatic interstitial tissue, coagulation-type necrosis of acinar tissue developed after 6 hr adjacent to these droplets, and within 24 hr the necroses had extended into the acinar parenchyma. Again, olive oil treatment produced a similar result of lesser extent. Mono-olein or paraffin oil caused no histological alterations of acinar cells. It is concluded that the olive oil-induced pancreatic necrosis results from the detergent effect of fatty acids, which are locally accumulated during lipolysis of injected triglycerides by pancreatic lipase, and that may destroy cellular membranes by their high surface activity. The fatty acids split off in fat necrosis during acute pancreatitis may also damage adjacent pancreatic acinar tissue.

4411 REGULATION OF RAT EXOCRINE PANCREATIC SECRETION BY BILE [Abstract].

(Eng.) Staub, J. L.; Sarles, H. (INSERM Unite 31, 46 chemin de la Gaye, 13009 Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1):48; 1977.

4412 INHIBITION OF PANCREATIC PROTEIN SECRETION BY INTRADUODENAL INFUSION OF FATTY ACIDS IN CONSCIOUS RATS: ANTI-CCK FACTOR [Abstract]. (Eng.) Demol, P.; Sarles, H. (INSERM U 31, 46 chemin de la Gaye, 13009 Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1):47-48; 1977.

4413 INTERACTION OF BILE SALTS AND NON-LIPOLYTIC PANCREATIC ENZYMES IN VIVO [Abstract]. (Eng.) Green, G. M. (Children's Hosp., Oakland, CA 94609). *Fed. Proc.* 37(3):459; 1978.

4414 A NEW PROTEASE IN HUMAN PANCREATIC JUICE [Abstract]. (Eng.) Rinderknecht, H.; Renner, I. G.; Carmack, C.; Freidman, R.; Koyama, P. (Veterans Admin. Hosp., Sepulveda, CA). *Clin. Res.* 26(2):112; 1978.

4415 GASTRIN AND CCK DO NOT MEDIATE THE HUMAN PANCREATIC POLYPEPTIDE (HPP) RESPONSE TO A MEAL [Abstract]. (Eng.) Taylor, I. L.; Coraziari, E.; Walsh, J. H.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 26(2):113A; 1978.

4416 EFFECT OF ALTERED INTRAGASTRIC pH ON HUMAN PANCREATIC POLYPEPTIDE (HPP) RELEASE [Abstract]. (Eng.) Taylor, I. L.; Walsh, J. H.; Hogan, D. L.; Isenberg, J. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 26(2):113A; 1978.

See also, 4399, 4551, 4599, 4782, 4997.

SECRETION AND METABOLISM

Hepatobiliary Tract

4417 EVALUATION OF LIVER FUNCTION BY INDOCYANINE GREEN (UJOVIRIDIN®) DURING NORMAL PREGNANCY, DELIVERY AND PUERPERIUM. (Ger.) Rudolf, H.; Goretzlehner, G.; Brugmann, E.; Towe, J.; Rudolf, K. (Klinik fur Innere Medizin, Ernst-Heydemann-Strasse, DDR-25, Rostock 1, E. Germany). *Zentralbl. Gynaekol.* 99(25):1548-1553; 1977.

Liver function was studied by the indocyanine green test (0.5 mg/kg i.v. in the form of bolus) during normal pregnancy, delivery, and *post partum* in 168 normal primigravidas and multigravidas and 18 normal nonpregnant women. None of the subjects had hepatopathy or cardiopathy. There was no significant difference in indocyanine green excretion between the control group (indocyanine half-life=3.64 min) and the pregnant women (3.77 min during the 8th week of pregnancy and 3.99 min during the 36th week). The half-life period increased during delivery (7.02 min), but it was normal again during the puerperium (3.92 min on the second day *post partum*). No placental transfer of the dye was demonstrable. The increase in the half-life during delivery is due to the physiological alterations of pregnancy. Indocyanine green is recommended instead of BSP for the estimation of the excretory function of the liver during pregnancy and puerperium.

4418 STUDIES USING SEDIMENTATION VELOCITY ON HETEROGENEITY OF SIZE AND FUNCTION OF HEPATOCYTES FROM MATURE MALE RATS. (Eng.) Sweeney, G. D.; Garfield, R. E.; Jones, K. G.; Latham, A. N. (McMaster Univ. Medical Center, 1200 Main St. West, Hamilton, Ontario L8S 4J9, Canada). *J. Lab. Clin. Med.* 91(3):432-443; 1978.

Methods to separate liver cells on the basis of size were developed to explore, using isolated cells, possible bases for selective centrilobular damage in liver damage by toxic substances. Hepatocytes were isolated from livers of fasted mature male Wistar rats after collagenase digestion. Examination of the size profile of these cells showed a modal peak ($3,979 \pm 277\ \mu m^3$, n=3) with significant skewing to the right. Sedimentation velocity analysis (SVA) permitted this hepatocyte suspension to be resolved into 12 fractions sedimenting at 97 to 25 mm/hr. Graphic representation of cell counts and cell volumes in fractions 1 to 12 recreated the cell size profile of the cell suspension prior to analysis. Mean volumes of cells in fractions 1 to 12 ranged from $10,920\ \mu m^3$ (fraction 1) to $2,320\ \mu m^3$ (fraction 12). Approximately one-fifth of recovered cells were found in fraction 9 (volume=$4,066\ \mu m^3$). Micromethods were developed to examine cytochrome P-450 content and aryl hydrocarbon hydroxylase (AHH) activity in fractionated cells. Analyses were conducted on paired fractions and expressed as a ratio of P-450 content per cell in the separated fractions to P-450 content per cell in the unseparated hepatocyte suspension. AHH was expressed similarly. Roughly sixfold greater P-450 content was found in fractions 1 + 2 than in fractions 9 + 10. The range for AHH activity was approximately fourfold, whereas the volumes of the cells differed only by a factor of 2.5. Cell densities were computed from sedimentation velocities and measured cell volume in each of fractions 1 to 12. Results ranged from 1.08 to 1.12 g/cm^3 with evidence for a discontinuity in the density profile in the region of fractions 5 to 7. This was attributed to the existence of two discrete cell populations: larger lighter cells and smaller heavier cells. Limited morphologic studies were conducted in which "large cells" (fractions 1 to 5) and "small cells" (fractions 8 to 11) were pooled and examined by electron microscopy. Cell detail was well preserved, difference in cell size was evident, and obviously binucleate cells were found only among the large cells. This work demonstrates significant heterogeneity among populations of hepatocytes and suggests that the larger cells have significantly greater activity of mixed function oxygenase systems. Sedimentation velocity-volume characteristics suggest the existence of two cell populations.

4419 EFFECTS OF PHENOBARBITAL AND 3-METHYLCHOLANTHRENE PRETREATMENT ON SIZE, SEDIMENTATION VELOCITY, AND MIXED FUNCTION OXYGENASE ACTIVITY OF RAT HEPATOCYTES. (Eng.) Sweeney, G. D.; Jones, K. G.; Krestynski, F. (McMaster Univ. Medical Center, 1200 Main St. West, Hamilton, Ontario L8S 4J9, Canada). *J. Lab. Clin. Med.* 91(3):444-454; 1978.

Sedimentation velocity analysis (SVA) was used to separate liver cells from rats pretreated for 3 days with phenobarbital (PB, 40 mg/kg, i.p., b.i.d.) or 3-methylcholanthrene (3-MC, 50 mg/kg as a single injection). Twelve fractions of cells were collected with sedimentation velocities (Vs) ranging from 97 mm/hr (fraction 1) to 25 mm/hr (fraction 12). PB caused the average volume of the largest cells recovered (fraction 1) to increase to 16,725 µm^3 from the 10,500 µm^3 previously reported in untreated animals. The number of cells recovered in the fast-sedimenting fractions (1-6) also increased in volume, but there was only a small rise in the average modal volume of hepatocytes determined prior to SVA. In cell suspensions analyzed after PB treatment, no evidence was found for a discontinuity in the distribution of density-volume characteristics. Prior to sedimentation analysis, hepatocyte suspensions from rats treated with PB contained an increased amount of cytochrome P-450. The average ratio (n=4) of P-450 in separated to unseparated cells ranged from 2.75 (fractions 1 + 2) to 0.38 (fractions 11 + 12), giving a 6.8-fold range in quantity of cytochrome per cell. Over this range, cell volume increased 4.2-fold, indicating a gradient in P-450 concentration similar to that previously reported to exist in cells from untreated rat liver. The gradient for aryl hydrocarbon hydroxylase (AHH) activity was 6.7-fold, suggesting that the activity of mixed function oxygenases (MFOs) paralleled the increase in cytochrome concentration. 3-MC pretreatment caused no significant increase in either size or number of cells in the fast-sedimenting fractions, but the discontinuity in density-volume characteristics that distinguished fast- and slow-sedimenting cells of untreated rats became marked. Furthermore, both the size and number of cells recovered in fractions 7 to 11 (that include the modal peak volume of unseparated hepatocytes) were increased. The gradient of P-450 (or P_1-450) was less steep in 3-MC-treated cells, with pooled fractions 1 and 2 containing an average of 4.62 times as much cytochrome as fractions 11 and 12. The gradient for AHH concentration was 4.29 times greater. The range of cell volume was 3.3-fold from fractions 1 + 2 to fractions 11 + 12. Additional experiments were performed to determine whether P-450, AHH, or NADPH cytochrome c reductase exhibited differences in activity or concentration per unit of cell volume between cells on either side of fraction 7 where discontinuity had been noted. Each variable was expressed per unit of cell volume in fractions 5 and 9; ratios were compared but were indistinguishable from unity. It is concluded that induction of MFO activity had occurred equally in both populations of cells. Densities were calculated from Vs and cell volume. Noticeable loss of density followed PB treatment in cells of all sizes. 3-MC had less of an effect on density but enhanced the increment in density observed at fraction 7, which corresponds to the division between cells with distinct sedimentation characteristics. These studies suggest that the enhancement by PB and 3-MC of different patterns of hepatic MFO activity are associated with different patterns of growth and development of the parenchymal cells during the 3-day treatment periods.

4420 HEPATIC CLEARANCE OF ENDOTOXINS: DIFFERENCES IN ARTERIAL AND PORTAL VENOUS INFUSION. (Eng.) Wolter, J.; Liehr, H.; Grun, M. (Dept. Surgery, Univ. Wuerzburg, W. Germany). *J. Reticuloendothel. Soc.* 23(2):145-152; 1978.

Studies were undertaken to determine whether there is a difference in the clearance of a fixed dose (0.16 mg/kg) of endotoxins by hepatic Kupffer cells when it is administered to minipigs via the hepatic artery or the portal vein. After arterial infusion, 11.4 µg of endotoxin per kg of body weight were extracted by the liver from the hepatic arterial blood before detectable amounts of endotoxin occurred in the hepatic venous blood in contrast to 57.0 µg/kg when administration was by portal venous infusion. This difference is thought to be due to at least two factors: (a) blood stream velocity within the liver (as measured by indocyanine green transit times), which was more rapid via the arterial route (3.6 ± 0.2 sec) than via the portal venous route (8.3 ± 0.3 sec) and (b) a shunting of blood flow due to portal hepatic venous and hepatic arterial venous intrahepatic shunts. Since such hemodynamic alterations are present in liver cirrhosis they may be the cause of the frequently observed systemic endotoxemia. These data indicate that endotoxin clearance is less efficient in the hepatic arterial blood system than in the hepatic portal venous system.

4421 BILE SECRETION AND LIVER CELL HETEROGENEITY IN THE RAT. (Eng.) Gumucio, J.

J.; Balabaud, C.; Miller, D. L.; DeMason, L. J.; Appelman, H. D.; Stoecker, T. J.; *et al.* (Univ. Michigan Medical Sch., Ann Arbor, MI 48109). *J. Lab. Clin. Med.* 91(2):350-362; 1978.

The contribution of hepatocytes of different acinar zones to bile salt transport and to the secretion of the bile salt-nonindependent fraction of canalicular water (BSNDF) was studied in female Sprague-Dawley rats. Changes in the removal of ^{14}C-taurocholate from blood, in the biliary secretion of taurocholate, and in canalicular flow were determined after damage of the periportal (acinar zone 1) or centrilobular (acinar zone 3) areas by allyl alcohol (6.2 mmol/kg) or bromobenzene (3.8 mmol/kg), resp. The extent of cell necrosis was quantitated by light microscopy, and the quality of the intracellular damage was assessed by electron microscopy. After either periportal or centrilobular damage, surviving cells responded to an i.v. infusion of taurocholate (300 nmol/min/100 g) by secreting bile salts into bile at a rate similar to controls. However, following the administration of ^{14}C-taurocholate at a high concentration (15 nmol/100 g) and as a single bolus, the rate of removal of this isotope from blood was slower than in controls. Both experiments suggest that periportal and centrilobular hepatocytes have the capability for bile salt transport. Consequently, since the concentration of bile salts in sinusoidal blood at each zone determines the relative contribution of hepatocytes to bile salt transport, periportal cells probably transport the largest amount of bile salts reaching the acinus. Canalicular bile flow, on the other hand, decreased following centrilobular cell damage, and this was associated with a high concentration of bile salts in bile. This suggests that, at bile salt loads near physiological concentrations, the predominant contribution of centrilobular hepatocytes is to the secretion of the BSNDF.

4422 STUDY OF BILE ACIDS BIOSYNTHESIS IN RAT LIVER SLICES USING [1-^{14}C]ACETATE: RESULTS WITH RATS FED A BASAL DIET WITH OR WITHOUT CHOLESTYRAMINE SUPPLEMENTATION.

(Fre.) Grandgeorge, M.; Duperray, B.; Pacheco, H. (Institut National de Sciences Appliquees, 20, ave. Albert-Einstein, F 69621 Villeurbanne, France). *J. Pharmacol.* 8(3):297-314; 1977.

A method for the *in vitro* measurement of bile acid synthesis is presented and applied to the investigation of the biosynthesis of cholesterol, cholic acid (C), chenodeoxycholic acid (CDC), and fatty acids in rat liver slices from male Wistar rats incubated with the radioactive precursor 1-^{14}C-acetate for 75 min. Following incubation, the bile acids were extracted, methylated, separated by column chromatography, purified by thin-layer chromatography, and their radioactivity compared to that of the remaining free cholesterol. In 10 rats on the unsupplemented diet, the ratio of C+CDC: cholesterol was dependent on the 7-α-hydroxylase activity, while the ratio CDC:C varied inversely with 6-β-hydroxylase and 12-α-hydroxylase activity. When rats were given cholestyramine (192 mg Dowex resin in suspension/rat/day, by intragastric tube) for 10 days prior to sacrifice, the production of C increased by 184% and the level of C+CDC rose 68%. The ratio CDC:C dropped from 1.82 to 0.77. Incorporation of 1-^{14}C-acetate into fatty acids rose by 55%, but this rise was not significant because of the wide scattering of results. The incorporation of 1-^{14}C-acetate into cholesterol increased by 340% and the amount of free cholesterol in the liver rose by 15%. Serum and intestinal cholesterol were not significantly increased over controls. These results are consistent with an activation of 7-α-hydroxylase, 12-α-hydroxylase, and 6-β-hydroxylase activities by cholestyramine.

4423 PHYSIOLOGICAL FACTORS INFLUENCING SERUM BILE ACID LEVELS.

(Eng.) Ponz de Leon, M.; Murphy, G. M.; Dowling, R. H. (Guy's Hosp. Medical Sch., London, England). *Gut* 19(1):32-39; 1978.

The effects of fasting (prolongation of an overnight fast for a further 4 hr), feeding (the response to eating the three main "solid" meals of the day), and cholecystokinin (CCK)-induced gallbladder contraction (75-100 U of CCK given as a bolus i.v. injection) on serum individual bile acids were studied in five to eight healthy subjects. The serum conjugates of cholic and chenodeoxycholic acids were measured using sensitive specific radioimmunoassays. During fasting, there was no significant change in the levels of the individual serum bile acids (conjugates of cholate, 1.28 ± 0.19 μM; conjugates of chenodeoxycholate, 1.17 ± 0.17 M). After breakfast, the serum conjugates of cholate and chenodeoxycholate increased significantly, but thereafter the mean values remained high with less consistent responses to lunch and dinner. Some subjects showed a peak and trough response to all three meals, while others showed a plateau response throughout the day. After breakfast, the serum chenodeoxycholate conjugates increased more rapidly (peak at 60 min, when the concentration reached 2.07 ± 0.30 μM) and to a greater extent than the conjugates of cholate (peak at 90 min, 1.50 ± 0.24 μM). A similar pattern of results was seen after i.v. CCK, suggesting either preferential jejunal absorption of chenodeoxycholate conjugates and/or preferential hepatic clearance of cholate conjugates. These results provide essential background data for future studies of serum individual bile acids in intestinal and hepatic disease.

4424 URSODEOXYCHOLATE--IN VITRO CHOLESTEROL SOLUBILITY AND CHANGES OF COMPOSITION OF HUMAN GALLBLADDER-BILE AFTER ORAL TREATMENT.

(Eng.) Igimi, H.; Tamesue, N.; Ikejiri, Y.; Shimura, H. (First Dept. Surgery, Fukuoka Univ., Fukuoka, 814, Japan). *Life Sci.* 21(9):1373-1379; 1977.

To investigate the usefulness of ursodeoxycholic acid (UDCA) for gallstone dissolution, the *in vitro* solubility of cholesterol in bile salt solutions with and without lecithin and the composition of gallbladder bile in 25 patients after treatment with UDCA were examined. Solutions of the Na salts of

UDCA, chenodeoxycholic acid (CDCA), and cholic acid (CA) were prepared at 100, 50, and 25 mM concentrations, and 50 and 100 mM solutions of equimolar amounts of NaUDCA and NaCDCA or of NaCA and NaUDCA were also made. Lecithin at one-fourth of the given salt concentration was added to these solutions for some experiments. Cholesterol solubility increased proportional to the salt concentration. NaCDCA had the best solubilizing properties and NaUDCA the worst (233.7 ± 2.0, 102.4 ± 1.8, and 42.3 ± 1.1 mg/dl compared to 2.1 ± 0.1, 1.5 ± 0.1, and trace mg/dl at 100, 50, and 25 mM, resp.). All other bile salt solutions gave intermediate results. The addition of lecithin to the bile salt solutions increased cholesterol solubilization to a large extent, but did not change the efficacy relationships among the bile salt solutions. Five groups of five patients each, all with diseases not in the hepatobiliary tract, were given daily p.o. doses of 0, 150, 300, 600, or 1,200 mg NaUDCA for 1 week. The content of total bile acids, phospholipids, and cholesterol as well as of the single bile acid UDCA were increased. At the 300 and 600 mg doses of UDCA, the mole percentage of total bile acids was increased ($p<0.01$), and that of phospholipids and of cholesterol was decreased ($p<0.01$ and $p<0.05$ or $p<0.01$, resp.). The 1,200-mg/day dose had a significant effect only on the cholesterol level, decreasing it ($p<0.01$). The UDCA treatment does not appear to influence the metabolism of the other bile acids as does treatment with CDCA. Oral treatment with UDCA should be inferior to CDCA treatment for the dissolution of gallstones.

4425 REMOVAL OF PLASMA BILIRUBIN BY HEMOPERFUSION IN DOGS.

(Eng.) Lopukhin, U. M.; Molodenkev, M. N.; Leykin, U. A.; Gorchakov, V. D.; Evseev, N. G.; Ryabov, A. V. (2nd Moscow Medical Inst., Moscow Inst. Chemical Technology, Moscow, USSR). *Am. J. Gastroenterol.* 68(4):345-353; 1977.

To develop and examine blood compatible adsorbents with high specificity for bilirubin, acute hepatic insufficiency was induced in mongrel dogs using common bile duct catheter infusion of 0.1 ml/kg carbon tetrachloride followed by ligation of the duct above and below the site of the catheter insertion and, 24 hr later, by hemoperfusion. The adsorbent MCTI-2A, a modified anion exchange resin, was investigated in an extracorporeal system. Blood samples were obtained at 5-min intervals from 0-60 min from the arterial line and at 5-min intervals from 6-61 min from the venous line, and the concentrations of K, Na, Cl$^-$, blood urea nitrogen, glucose, total protein, albumin, Ca, uric acid, inorganic phosphates, cholesterol, and total bilirubin were measured. The platelet count, WBC count, hematocrit, rate of hemolysis, acid balance, and the activities of alkaline phosphatase, LDH, SGOT, and SGPT were determined. No substantial physiological or biochemical changes were observed during perfusion; hemolysis was constant, WBC count decreased somewhat, the hematocrit was reduced 2-4%, and the acid-base balance did not change. There was no adsorption of cholesterol, and the activities of the enzymes measured were not altered. After 5-10 min of perfusion, bilirubin adsorption became greater than the rate of its flux from tissue stores and its concentration in the blood fell, if the initial concentration of bilirubin in the blood was high. With a low initial level of bilirubin (1-3 mg/dl), the level in the blood did not decrease because the rate of flux from the tissues was equal to or greater than the rate of removal by adsorption in the column. The results show that MCTI-2A adsorbent may prove to be useful for the treatment of hyperbilirubinemia.

4426 MULTICOMPARTMENTAL ANALYSIS OF CHOLESTEROL METABOLISM IN MAN: CHARACTERIZATION OF THE HEPATIC BILE ACID AND BILIARY CHOLESTEROL PRECURSOR SITES.

(Eng.) Schwartz, C. C.; Berman, M.; Vlahcevic, Z. R.; Halloran, L. G.; Gregory, D. H.; Swell, L. (Veterans Admin. Hosp., Richmond, VA 23249). *J. Clin. Invest.* 61(2):408-423; 1978.

Six patients who had undergone cholecystectomy and choledocholithotomy for gallstones and who each had a balloon-occludable T-tube in the common bile duct were given simultaneous i.v. injections of various combinations of ^{14}C-mevalonic acid, ^{3}H-mevalonic acid, and ^{14}C-cholesterol, and the secretion of bile acids and biliary cholesterol was monitored to develop a multicompartmental model of cholesterol metabolism in man. Bile was collected for short intervals (5, 15, or 30 min) during the first 4 hr after administration of the labeled compounds and for longer intervals until the end of the experiment. Venous blood (5 ml) was collected at frequent intervals. The qualitative features of the specific activity time course curves after labeled mevalonic acid and cholesterol revealed no precursor-product relationship between bile acid, biliary cholesterol, and plasma free cholesterol. The data were subjected to simulation analysis and computer modeling, with the constraint that the model fit the data obtained from both ^{14}C-cholesterol and ^{3}H-mevalonic acid. The fluxes arrived at in the model indicate that 31% and 20%, resp., of the cholesterol input into the bile acid and biliary cholesterol precursor sites were derived directly from the newly synthesized hepatic cholesterol. The remainder had its origin predominantly from lipoprotein-free cholesterol. Plasma esterified cholesterol (as free) made a small contribution (11%) to the bile acid compartment. Ten percent of the biliary cholesterol arose from an unknown hepatic site. These findings provide evidence for the existence of specific hepatic cholesterol precursor sites associated with the formation and secretion of bile acids and biliary cholesterol and a mechanism regulating the partitioning of lipoprotein free cholesterol between the bile acid and biliary cholesterol precursor sites.

4427 ZINC UPTAKE BY ISOLATED RAT LIVER PARENCHYMAL CELLS.

(Eng.) Failla, M. L.; Cousins, R. J. (Dept. Nutrition, Rutgers-State Univ. New Jersey, New Brunswick, NJ 08903). *Biochim. Biophys. Acta* 538(3):435-444; 1978.

Primary cultures of rat liver parenchymal cells maintained as a monolayer in serum-free culture medium were used to investigate the characteristics of zinc accumulation *in vitro*. Liver parenchymal cells accumulated zinc by a temperature-dependent, saturable process. Approximately 25 times more zinc was associated with cells incubated at 37 C than replicate cell cultures at 0 C. Zinc accumulation was inhibited by cyanide (2.5 mM), azide (5.0 mM), oligomycin (0.07 mM), *N*-ethylmaleimide (5.0 mM), and iodoacetamide (5.0 mM); the amounts of zinc accumulated in the presence of each inhibitor were 38.5%, 73.1%, 65.4%, 34.6%, and 23.1% of control, resp. Cadmium reversibly inhibited zinc accumulation in both serum-free and serum-containing media. Gel filtration chromatography showed that recently accumulated intracellular zinc was present as a low molecular weight complex smaller than metallothionein, the zinc storage protein, but larger than individual amino acids. The quantity of zinc accumulated was affected by preincubation of the cells with various hormones. Dexamethasone, prednisone, and prednisolone each increased zinc uptake by 40-50% when either insulin or glucagon was also present. Hydrocortisone, cortisone, and sex steroids did not influence zinc accumulation. Removal of the polypeptide hormones from the medium abolished the stimulatory effect of the synthetic glucocorticoid steroid hormones on zinc accumulation. The characteristics of zinc accumulation by rat liver parenchymal cells are similar to those reported for zinc transport in microorganisms, HeLa cells, and human lymphocytes.

4428 THE METABOLISM OF DRUGS IN ISOLATED RAT HEPATOCYTES. A COMPARISON WITH IN VIVO DRUG METABOLISM AND DRUG METABOLISM IN SUBCELLULAR LIVER FRACTIONS.

(Eng.) Billings, R. E.; McMahon, R. E.; Ashmore, J.; Wagle, S. R. (Dept. Pharmacology, Univ. Iowa, Iowa City, IA 52242). *Drug Metab. Dispos.* 5(6):518-526; 1977.

To more closely approximate *in vivo* liver metabolism in an *in vitro* system, drug metabolism was studied in isolated liver cells rather than in liver homogenate fractions. The ability of isolated hepatocytes from male Sprague-Dawley rats to metabolize α-1-acetylmethadol (LAM), *d*-propoxyphene, butamoxane, ethinimate, 8-methoxybutamoxane (8-MB), *p*-nitrophenol (PNP), *N,N*-dimethylphenoxyethylamine (DPE), and *N,N*-dimethyl-*p*-chlorophenoxyethylamine (DCPE) was studied. This metabolism was compared to that *in vivo* and in 9,000 x *g* supernatant and microsomal liver fractions. Butamoxane and ethinimate were hydroxylated at a linear rate for at least 2 hr in isolated hepatocytes, but the *N*-methylation of LAM was linear only for 30 min. PNP was rapidly metabolized to the glucuronide conjugate. The metabolic rates of LAM, *d*-propoxyphene, and DPE were similar in hepatocytes and in the 9000 x *g* supernatant, but those of DCPE, ethinimate, butamoxane, and 8-MB were considerably slower. The rate limiting factor was not the NADPH concentration, the NADPH/NADP$^+$ ratio, or the cytochrome P-450 concentration. Ethinimate metabolism exhibited a lower V_{max} (nmol/mg protein/15 min) in the isolated hepatocytes (7.81 ± 0.42) than in the supernatant fraction (10.90 ± 0.55). Butamoxane was rapidly hydroxylated (nmol/nmol cytochrome P-450/min) in all the systems examined, the rate being similar in perfused liver (1.8 ± 0.19) and in isolated hepatocytes (2.3 ± 2.7) but 2.5-fold higher in microsomes (4.8 ± 0.37). The identification of ketoethinimate, a new metabolite of ethinimate, as a result of the use of intact cells, and its subsequent discovery in the urine of rats dosed with ethinimate, showed the value of using intact cells in metabolic studies of new drugs. Ethinimate metabolism in isolated hepatocytes correlated well with its metabolism in the rat. The study indicated that drug metabolism in isolated hepatocytes more closely resembles *in vivo* metabolism than that observed in liver homogenate fractions such as microsomes.

4429 THE HEPATIC EFFECTS OF HYPOLIPIDEMIC DRUGS (CLOFIBRATE, NAFENOPIN, TIBRIC ACID, AND Wy-14,643) ON HEPATIC PEROXISOMES AND PEROXISOME-ASSOCIATED ENZYMES.

(Eng.) Moody, D. E.; Reddy, J. K. (Northwestern Univ. Medical Sch., Chicago, IL 60611). *Am. J. Pathol.* 90(2):435-446; 1978.

Male Swiss-Webster mice were fed diets containing four hypolipemic agents known to induce proliferation of hepatic peroxisomes, to determine their effects on liver enlargement and hepatic peroxisome-associated enzyme activities. Treatment with all four drugs (clofibrate, nafenopin, tibric acid, and Wy-14,643; 0.25%, 0.125%, 0.125%, and 0.125% of diet, resp., for 28 days) produced marked hepatomegaly in the mice. The extent of the increase in liver weight correlated well with the increases in total hepatic DNA (r=0.856) and in the collective volume of hepatocyte peroxisomes (r=0.667). Treatment with these drugs also produced similar increases in the activities of peroxisome-associated enzymes. The most dramatic increases were noted in the activities of the short-chain (8- to 26-fold) and medium-chain (4- to 11-fold) carnitine acyltransferases. Significant increases were also noted in the activities of catalase (twofold to threefold), α-glycerophosphate dehydrogenase (twofold to threefold), and the long-chain carnitine acyltransferase (twofold to fourfold). Activity of the latter enzyme, however, is not known to be associated with peroxisome fractions. Concomitant administration of actinomycin D (10 min, 0.75 mg/kg, i.p.) or cycloheximide (1.5 mg/kg, i.p.) with a single p.o. dose of clofibrate diminished the increases in liver weight and carnitine acyltransferase activity that had occurred with clofibrate treatment alone. The finding that the major increase in activity of peroxisome enzymes occurred in those associated with metabolism of acyl coenzyme A groups supports the hypothesis that the hypolipemic action of the drugs and the proliferation of hepatic peroxisomes are related functions.

4430 A QUANTITATIVE ANALYSIS OF FINE STRUCTURE AND DRUG METABOLISM IN LIVERS OF CLOFIBRATE-TREATED YOUNG ADULT AND RETIRED BREEDER RATS.

(Eng.) Anthony, L. E.; Schmucker, D. L.; Mooney, J. S.; Jones, A. L. (San Francisco Veterans Admin. Hosp., San Francisco, CA 94121). *J. Lipid Res.* 19(2):154-165; 1978.

The effects of clofibrate on the fine structure and drug metabolizing capacity of livers of normolipemic young adult virgin (YA) and hypercholesterolemic retired breeder (RB) male rats were measured by morphometric and biochemical procedures. The p.o. administration of clofibrate (200 mg/kg) for 7 days significantly increased liver weight ($p<0.001$) and reduced the cholesterol concentrations in the serum and liver tissue ($p<0.001$) in both groups of animals. The hepatic triglyceride (TG) concentration and the volume of cytoplasmic lipid droplets, presumably TG, as well as the serum TG concentration, increased only in the drug-treated RB rats ($p<0.001$ and $p<0.05$, resp.). Clofibrate treatment resulted in significant increases in the volumes of the hepatocytes (by 78% and 50% in YA and RB rats, resp., $p<0.005$), in their constituent mitochondria (134% and 58%, resp., $p<0.001$) and microbodies (518% and 292%, resp., $p<0.001$), and caused a proliferation of the smooth endoplasmic reticulum (50% and 29%, resp., $p<0.001$). Although the magnitude of the hypocholesterolemic response was considerably greater in the RB animals, the morphological changes were much more marked in the YA group. However, the surface area of the rough endoplasmic reticulum was reduced in the livers of the drug-treated RB rats. NADPH cytochrome c reductase specific activity was significantly increased ($p<0.001$) in both the RB and YA animals, but the concentration of cytochrome P-450 increased only in the YA rats ($p<0.001$). Neither the cytochrome b_5 concentration nor the rate of ethylmorphine *N*-demethylation was significantly affected by clofibrate administration. The results suggest that there is no positive correlation between the hypocholesterolemic response to clofibrate and the degree of subcellular changes in the hepatocytes and that this hypolipemic drug elicits a minimal effect on the concentrations of the components of the hepatic microsomal drug metabolizing system.

4431 CHANGES IN THE PLASMA CLEARANCE AND PROTEIN BINDING OF CARBENOXOLONE WITH AGE, AND THEIR POSSIBLE RELATIONSHIP WITH ADVERSE DRUG EFFECTS. (Eng.) Hayes, M. J.; Sprackling, M.; Langman, M. J. S. (Univ. Nottingham Medical Sch., Nottingham, England). *Gut* 18(12):1054-1058; 1977.

In an effort to understand the adverse side-effects of carbenoxolone treatment for gastric ulcer, a comparison was made by equilibrium dialysis of plasma protein binding sites for carbenoxolone in healthy people under 40 yr of age or over 65 yr of age. Only four of the elderly subjects were receiving any medication. Carbenoxolone (300 mg, p.o.) was administered, and blood samples were taken for analysis at 2, 4, 8, 12, 24, and 36 hr after drug ingestion. The number of binding sites was reduced ($p<0.01$) in the elderly, and this fall was associated with a reduction in plasma albumin levels ($p<0.01$, $r=0.85$). Although carbenoxolone had some aldosterone-like effects, these properties could not be shown to be due to displacement of aldosterone from its protein binding sites by competitive protein binding of carbenoxolone. Single doses of carbenoxolone were found to be removed considerably more slowly from the plasma ($p<0.05$) and to have a markedly longer half-life ($p<0.02$) in elderly individuals than in the young. The results of these three series of experiments suggest that the side-effects of carbenoxolone in the elderly may in part be caused by reduced protein binding, leaving more free drug in the active unbound form, and in part by reduced hepatic clearance mechanisms.

4432 ALTERATIONS OF RAT SERUM LIPOPROTEINS AND LECITHIN-CHOLESTEROL-ACYLTRANSFERASE ACTIVITY IN PRASEODYMIUM-INDUCED LIVER DAMAGE. (Eng.) Grajewski, O.; Von Lehmann, B.; Arntz, H. R.; Arvela, P.; Oberdisse, E. (Pharmakologisches Institut der Freien Universitat Berlin, Thielallee 69/73, D-1000 Berlin 33, W. Germany) *Naunyn Schmiedebergs Arch. Pharmacol.* 301(1):65-73; 1977.

The alterations in serum lipids during liver damage induced by the i.v. injection of 10 mg/kg praseodymium nitrate (Pr) were studied in female Wistar rats. The triglycerides (TG) decreased to about 50% of the control values after 2 days. Total phospholipids (TPL) and cholesterol (C) showed a parallel time course: a 50% decrease 2 and 4 days after Pr administration was followed by a 50% increase at 4 days. The changes in the TPL were mainly due to alterations of phosphatidylcholine (PC) concentration, while the decrease in the concentration of C during the first 2 days was caused by a decrease of the esterified cholesterol (EC), whereas unesterified cholesterol (UC) was responsible for the subsequent increase of C. The fractionation of the serum lipoproteins (Lp) by sequential ultracentrifugation demonstrated a different response to Pr in each Lp class. At 2 days, the very low density lipoprotein (VLDL) concentration decreased by 50%. Experiments with Triton WR 1339 showed an inhibition of hepatic TG secretion at this time. On the other hand, the low density lipoprotein (LDL) increased to more than four times the controls, 4 days after Pr. The accumulating LDL were abnormally rich in UC and PC. Up to 2 days after Pr, the high density lipoprotein (HDL) content declined to about 20% of the concentration in control animals. During the subsequent recovery, the lipid pattern altered as UC and TPL were increased; the HDL_2 were particularly involved. Concomitant with the changes in the lipid patterns of LDL and HDL, the activity of serum lecithin-cholesterol-acyltransferase (LCAT) decreased to about 15% of the initial value, 3 days after Pr. From these results, it is concluded that (1) after Pr, the VLDL, HDL, and LCAT secretion of the liver is inhibited; (2) in the LDL, HDL, and less in the VLDL, UC- and PC-rich Lp occur, resulting in an altered Lp lipid pattern; and (3) the alteration of the lipid pattern is mainly due to the diminution of LCAT activity.

4433 EFFECTS OF CHRONIC ETHANOL CONSUMPTION ON THE RATE OF RAT LIVER MITOCHONDRIAL PROTEIN TURNOVER AND SYNTHESIS. (Eng.) Hofmann, I.; Hosein, E. A. (Dept. Biochemistry, McGill Univ., Montreal, Quebec H3G 1Y6, Canada). *Biochem. Pharmacol.* 27(4):457-463; 1978.

The effect of an overall decrease in mitochondrial protein synthesis on the protein turnover rate of mitochondria harvested from the livers of Metrecal-fed controls and chronic ethanol-fed rats was investigated. In addition, experiments were carried out to determine whether the decrease in mitochondrial leucine incorporation represents selective inhibition of leucine incorporation into certain individual proteins or a decrease in total incorporation of labeled leucine in mitochondrial proteins. Incorporation *in vitro* of labeled leucine into isolated Sprague-Dawley rat liver mitochondria was decreased 33-37% in animals chronically fed ethanol (37% of total calories). To avoid artifactual leucine incorporation, no trichloroacetic acid (TCA) precipitation was performed. When these mitochondrial proteins were separated on sodium dodecyl sulfate polyacrylamide gels, no specific reduction of leucine incorporation into any individual protein band was detected. This probably reflected a general decrease in amino acid incorporation occurring in these isolated mitochondria. Incorporation *in vivo* of labeled arginine revealed a decrease in the viability of rat liver mitochondria from chronic ethanol-fed rats, as there as a 2-day decrease in the half-life of these liver mitochondria. Arginine incorporation by the cytoplasmic protein-synthesizing system was increased *in vivo* after chronic ethanol feeding. The results suggest that, if this reaction were to persist through continuous consumption of ethanol, there would in time be diminished amounts of properly assembled proteins that are necessary for membrane structure and function. Whether such induced deficiencies in the mitochondria over a long period of time are precursors for alcoholic hepatitis and/or cirrhosis remains to be elucidated.

4434 ULTRASTRUCTURAL AND BIOCHEMICAL ASPECTS OF LIVER MITOCHONDRIA DURING RECOVERY FROM ETHANOL-INDUCED ALTERATIONS: EXPERIMENTAL EVIDENCE OF MITOCHONDRIAL DIVISION.

(Eng.) Koch, O. R.; Roatta de Conti, L. L.; Pacheco Bolanos, L.; Stoppani, A. O. M. (Centro de Patologia Experimental, Facultad de Medicina, Jose E. Uriburu 950, 1114-C.F., Buenos Aires, Argentina). *Am. J. Pathol.* 90(2):325-344; 1978.

Morphologic and biochemical changes occurring in liver mitochondria during recovery from ethanol-induced injury were studied in rats fed a 6-month high-alcohol regimen (37% of diet) plus a nutritionally adequate diet that did not induce fatty liver and compared with isocalorically fed controls. After this period, the alcohol-fed animals displayed striking ultrastructural changes of liver mitochondria and a decreased respiratory activity with succinate or malate-glutamate as substrate. On the contrary, the respiratory rate with 1-glycerophosphate was 50% increased. Regression changes were studied after alcohol was withdrawn from the diet. Enlarged mitochondria rapidly disappeared (in 24 hr), although a few megamitochondria were still present after 8 days of abstinence. A similar recovery was observed for the functional alterations. At the end of the experimental period, only a slight decrease of the maximal respiratory rate using malate-glutamate as substrate was noted. The ultrastructural findings and the morphometric data suggests that the way in which mitochondrial normalization takes place is based on partition of these organelles.

4435 ALCOHOL, AMINO ACIDS, AND ALBUMIN SYNTHESIS. III. EFFECTS OF ETHANOL, ACETALDEHYDE, AND 4-METHYLPYRAZOLE.

(Eng.) Oratz, M.; Rothschild, M. A.; Schreiber, S. S. (New York Veterans Admin. Hosp., New York, NY). *Gastroenterology* 74(4):672-676; 1978.

The effects of ethanol, 4-methylpyrazole (4-MP), and acetaldehyde on albumin and urea synthesis and on polysome aggregation were studied in isolated perfused rabbit livers. Fed or fasted male rabbits served as donors, and the perfusate contained ethanol (200 mg/100 ml), with and without 1.5 mM 4-MP, or acetaldehyde (2 mg/100 ml), with and without 1.5 mM 4-MP. In livers from fed donors, ethanol depressed albumin and urea synthesis ($p<0.05$) in comparison with controls, and bound polysomes were disaggregated. Perfusion with acetaldehyde caused a similar decrease in albumin and urea synthesis, but did not cause polysome disaggregation. The addition of 4-MP to the ethanol perfusates did not enhance albumin or urea synthesis but did prevent polysome disaggregation. When the donor was fasted, the addition of 4-MP to the ethanol perfusates restored urea synthesis and polysome aggregation to fasted control levels. In the livers from fasted donors, acetaldehyde did not lower albumin or urea synthesis and had no effect on polysome aggregation. The results indicate that the hepatic responses to ethanol and acetaldehyde are different if the livers are derived from fed or fasted donors, and it is not possible to ascribe the toxic effects of acetaldehyde or ethanol on albumin and urea synthesis to either agent, *per se*.

4436 PREVENTION OF ALCOHOL-INDUCED FATTY LIVER BY NATURAL METABOLITES AND RIBOFLAVIN.

(Eng.) Stanko, R. T.; Mendelow, H.; Shinozuka, H.; Adibi, S. A. (Montefiore Hosp., Pittsburgh, PA 15213). *J. Lab. Clin. Med.* 91(2):228-235; 1978.

To develop a satisfactory treatment for alcohol-induced fatty liver, the hepatic lipotropic potential of a variety of natural compounds, known to be hydrogen acceptors and/or intermediates in oxidative metabolism of foodstuffs, was investigated in male Sprague-Dawley rats receiving ethanol (1.5 ml of 47.5% ethanol/100 g/day) for 10 days while on the usual rat diet (4.5% fat). Among the compounds tested, a combination of pyruvate, dihydroxyacetone, and riboflavin appeared to be most effective in preventing the ethanol-induced accumulation of esterified hepatic fatty acids ($p<0.01$). Additional studies were performed to investigate the efficacy of these compounds when the fat content of diet was increased to simulate the human diet (35% of caloric intake) and when the duration of ethanol ingestion (33% of caloric intake) was prolonged to 30 days. There was a threefold increase in triglyceride concentration and a 65% increase in the total esterified fatty acid concentration (neither increase being significant) of the liver of ethanol-treated rats as compared to controls. But when pyruvate, dihydroxyacetone, and riboflavin were added to the diet of ethanol-treated rats, these changes were abolished. Light and electron microscopy of the liver revealed that ethanol caused mitochondrial irregularity, vesiculation of the rough endoplasmic reticulum, and a 4+ increase in lipid content. These histological and ultrastructural changes were also abolished when pyruvate, dihydroxyacetone, and riboflavin were added to the diet of ethanol-treated rats. Thus the efficacy of the above compounds as hepatic lipotropic agents appears well established in ethanol-treated rats whether on a low- or high-fat diet.

4437 RENAL SODIUM RETENTION AND ASCITES FORMATION IN DOGS WITH EXPERIMENTAL CIRRHOSIS BUT WITHOUT PORTAL HYPERTENSION OR INCREASED SPLANCHNIC VASCULAR CAPACITY.

(Eng.) Levy, M.; Wexler, M. J. (McGill Univ., Rm. 1228, 3655 Drummond St., Montreal, Quebec H3G 1Y6, Canada). *J. Lab. Clin. Med.* 91(3):520-536; 1978.

Renal handling of sodium was studied in five dogs in which an end-to-side portacaval fistula was constructed prior to the induction of cirrhosis with dimethylnitrosamine (DMN). The technique enabled the study of the effective expansion of the plasma volume in dogs with cirrhosis, ascites, and active urinary sodium retention and the determination of the role of portacaval collaterals in the initiation of renal sodium retention. This model permits the effects of cirrhosis to be studied separately from the consequences of portal hypertension. Three controls without cirrhosis maintained normal liver and kidney function and remained in sodium balance for as long as 8 weeks following surgery. In the five cirrhotic dogs, urinary sodium retention preceded ascites formation and was independent of hyperaldosteronism, hypoalbuminemia, hepatic ischemia, or decreased renal perfusion. Portal venous pressure remained normal in all cirrhotic dogs, and the splanchnic area remained free of venous collaterals. Plasma volume expansion also preceded ascites formation, and this variable increased by 8.4% ($p<0.05$) following 6 days of sodium retention. These temporal relations between sodium retention, expanded plasma volume, and ascites formation are similar to those previously observed in ordinary cirrhotic dogs. Total plasma volume increased by 13.2% ($p<0.05$) when measured during the ascitic phase of cirrhosis. However, when the splanchnic and nonsplanchnic (effective) components of plasma volume were measured by an exclusion technique, the ratio of these components to total plasma volume was not different from that observed in normal dogs. Thus, no preferential consignment of retained salt and water had occurred. It is concluded that urinary sodium retention in cirrhotic dogs occurs independently of portal hypertension or augmented splanchnic vascular capacity and is associated with expansion of the effective plasma volume, even though ascites is present.

4438 EXTRACORPOREAL PERFUSION WITH BABOON LIVER IN THE TREATMENT OF HEPATIC COMA.

(Ger.) Lie, T. S.; Dengler, H. J.; Gutgemann, A.; Rommelsheim, K.; Lelbach, W. K.; Holst, A.; Marsteller, H. J.; *et al.* (Chirurgische Universitatsklinik, 5300 Bonn 1, Venusberg, W. Germany). *Dtsch. Med. Wochenschr.* 102(42):1506-1511; 1977.

Eleven patients with hepatic coma (stage IV and V according to Abouna) were treated by extracorporeal blood perfusion with 22 baboon livers and one human liver over 12-27 hr, using the Scribner shunt (radial or profunda femoris artery). Ten patients had viral hepatitis, and one had acute liver cell necrosis. The duration of the coma before the perfusion was 1-3 days in 10 cases and 4 days in 1 case. Five patients received one perfusion treatment and the others received two to four. As a result of the treatment, eight patients emerged from the coma, and six of them showed regeneration of the liver. Four of these patients were cured and the others died (4 from liver insufficiency, 1 from pancreatic necrosis, 1 from acute hemorrhage, and 1 from uncontrollable hemorrhage from an old ulcer). No antibodies to baboon proteins were found after perfusion, which means there is very little danger of anaphylactic reaction upon repeated perfusion. The preformed cytotoxic antibody titer to baboon cells rose in the patients' serum only after 1-2 weeks, and decreased again after 4 weeks. The findings indicate that extracorporeal perfusion with baboon or human liver is a promising method for treatment of hepatic coma.

4439 A MODEL OF FULMINANT HEPATIC FAILURE IN THE RABBIT.

(Eng.) Blitzer, B. L.; Waggoner, J. G.; Jones, E. A.; Gralnick, H. R.; Towne, D.; Butler, J.; *et al.* (Liver Unit, DDB, NIAMDD, Bld. 10, Rm. 4D-52, Natl. Inst. Health, Bethesda, MD 20014). *Gastroenterology* 74(4):664-671; 1978.

A highly reproducible model of fulminant hepatic failure was developed by administering galactosamine hydrochloride (4.25 mmol/kg, i.v.) to 34 genetically uniform rabbits. Twenty-five rabbits died between 21 and 44 hr after injection following a period of coma that lasted an average of 2.6 hr. An additional five rabbits died between 44 and 91 hr; there were two early deaths (<20 hr) and two survivors. Serum biochemical tests and liver histology reflected massive hepatic injury. Changes in plasma ammonia and amino acid concentrations, in coagulation parameters, and in the electroencephalogram were similar to those found in human fulminant hepatic failure. This model appears promising for future studies of the pathogenesis and treatment of fulminant hepatic failure.

4440 EXPERIMENTAL LIVER FAILURE: A COMPARISON BETWEEN HEPATECTOMY AND HEPATIC DEVASCULARIZATION IN THE PIG. (Eng.) Tonnesen, K. (Rigshospitalet, Copenhagen, Denmark). *Acta Chir. Scand.* 143(5):271-277; 1977.

The use of hepatectomy and total hepatic devascularization in pigs as models of human hepatic failure were compared. No significant difference was found in the survival time that was 16 hr 2 min ± 57 min in the anhepatic and 18 hr 33 min ± 1 hr 5 min in the devascularized pigs. The blood pressure of the anhepatic pigs decreased gradually; in contrast, that of the devascularized pigs remained stable during most of the experimental period with a terminal steep decrease. Except for an increase in the concentration of serum alanine aminotransferases and free hemoglobin, seen in the devascularized but not in the anhepatic preparation, no differences between the two models were seen. It is concluded that the devascularized preparation is the most suitable model for experimental hepatic failure.

4441 CHOLESTEROLOSIS: PHYSICAL-CHEMICAL CHARACTERISTICS OF HUMAN AND DIET-INDUCED CANINE LESIONS. (Eng.) Holzbach, R. T.; Marsh, M.; Tang, P. (St. Luke's Hosp., Cleveland, OH 44106). *Exp. Mol. Pathol.* 27(3):324-338; 1977.

A canine model was developed for cholesterolosis, and the naturally occurring human and the experimental lesions were compared by physical and chemical analysis of tissue lipids. A lesion with similarities to the human planar form of cholesterolosis was reproducibly induced by feeding a cholesterol, cholic acid-containing diet (1.0% by caloric value and 0.5% by mass, resp.) to 12 dogs for 9 months. Identical physical and chemical analyses were performed on the canine lesions and those from 17 human gallbladder cholesterolosis samples. Gross and histopathological similarities were seen in the human and experimental lesions, with the most notable difference being that the canine lesion is entirely epithelial (mucosal), whereas the human lesion is submucosal. Physically and chemically, the lesions showed both differences and resemblances. The lipid composition of the human and canine lesions varied significantly with respect to cholesterol esters, triglycerides, free fatty acids, and free cholesterol ($p<0.05$, $p<0.05$, $p<0.005$, and $p<0.05$, resp.), but not with respect to phospholipids. Subfractionation of the component cholesterol esters and free fatty acid species showed similarities in compositional pattern for the canine and human lesions. The relative degree of cholesterol saturation in gallbladder biles varied from a saturation index of 0.1 (controls) to 0.2 (experimental lesions) in dogs; the saturation index was 1.6 in the humans with lesions, but this was not appreciably higher than in healthy controls. The lack of correlation between cholesterol saturation and extent or chemical characteristics of cholesterol lesions argues strongly against a role for biliary cholesterol supersaturation in the pathogenesis of cholesterol lesions. The chemical similarity in either case by lipid-lipid interaction generates development of a two-phase system, including a quantitatively variable lamellar mesophase component, which accounts for birefringent properties. The etiology of cholesterolosis appears unrelated to the process of human gallstone formation. Similarities were observed between the lipid composition of the human intimal fatty streak lesion of atherosclerosis and that of human cholesterolosis, despite the differences in lipid localization.

4442 EFFICACY OF VITAMIN E AND SODIUM SELENITE IN EXPERIMENTAL LIVER DYSTROPHY. (Rus.) Skakun, N. P.; Nesterovich, Ia. M. (Dept. Pharmacology, Medical Inst., Ternopol, USSR). *Farmakol. Toksikol.* 40(4):434-438; 1977.

The efficacy of combined administration of vitamin E and sodium selenite was studied in albino rats with CCl_4-induced liver dystrophy. Animals received daily s.c. injections with 50% CCl_4 (0.4 ml/100 g, for 4 days), daily i.m. injections with vitamin E (10 mg/100 g) and/or daily s.c. injections of sodium selenite (2 μg/100 g). The functional state of the liver was evaluated on days 7, 14, 21, and 28 of the experiment. Rats exposed to CCl_4 alone showed a marked decrease of bile secretion and of the content of bile cholates. Lethality in nontreated rats was 12.5% (compared with 0% in treated animals). Bile secretion was increased by 9% in rats treated with vitamin E alone, by 22% in rats treated with sodium selenite alone, and by 25% in rats treated with a combination of the drugs. Treatment by these three regimens also increased the content of bile cholates (by 29%, 30%, and 52%, resp.).

4443 STUDIES ON HUMAN HEPATITIS A VIRUS IN CHIMPANZEES. (Eng.) Thornton, A.; Tsiquaye, K. N.; Zuckerman, A. J.(London Sch. Hygiene and Tropical Medicine, London WC1E 7HT, England). *Br. J. Exp. Pathol.* 58(4):352-358; 1977.

Five chimpanzees found to be seronegative for hepatitis A by immune electron microscopy and by radioimmunoassay were inoculated with known infective fecal extracts from several sources, including the MS-1 strain of hepatitis A virus, first passage material from a chimpanzee, and a strain of hepatitis A virus obtained during a naturally-occurring outbreak of infection in Germany. Elevated serum transaminase levels were found in the chimpanzees about 19 days after inoculation. Virus particles were found in feces as early as 9 days after infection in one chimpanzee and by days 12 and 14 in the others. Excretion of virus continued for 9 to 19 days, and the maximum numbers of virus particles were found on the 17th to the 19th day after inoculation. The buoyant density in cesium chloride of virus particles separated from feces was 1.31 to 1.43 g/ml. Most of the particles were found in the fraction with a density of 1.34 g/ml. Hepatitis A antibody was detected in the serum by immune electron microscopy and by radioimmunoassay during the period of incubation while virus particles were still being excreted in the feces and coinciding approximately with the onset of biochemical evidence of liver damage. A very close or identical morphological and serological relationship was demonstrated between hepatitis A virus isolated from man and from the experimentally infected chimpanzees. The chimpanzee is a realistic source of hepatitis A virus for biophysical and biochemical characterization of the virus and for the development and application of serological tests.

4444 EXPERIMENTAL LIVER NECROSIS: HEPATIC ERYTHROCYTE SEQUESTRATION AS A CAUSE OF ACUTE ANEMIA. (Eng.) Miller, D. J.; Pichanick, G. G.; Fiskerstrand, C.; Saunders, S. J. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Am. J. Dig. Dis.* 22(12):1055-1059; 1977.

The cause of the acute anemia previously observed in pigs manifesting acute liver necrosis after the administration of acetaminophen in dosages in excess of the LD_{100} was investigated. Liver damage was produced in phenobarbital (45 mg/kg for 3 days, i.m.)-pretreated pigs by the administration of acetaminophen by gavage (1.1 g/kg). A highly significant correlation was found between the degree of anemia and the increase in liver weight ($p<0.001$), and a similarly significant correlation was noted between the increase in liver weight and the ^{51}Cr activity in the liver after the administration of autologous ^{51}Cr-labeled RBC. Marked hepatic RBC sequestration was confirmed histologically, whereas there was minimal RBC accumulation in extrahepatic tissue. The RBC glutathione content was not altered by acetaminophen administration. It is concluded that hepatic sequestration of RBC occurred to a sufficient extent to account for the precipitous fall in hematocrit.

4445 CARBOHYDRATE METABOLISM AND ITS ZONATION IN RAT LIVER PARENCHYMA DURING REGENERATION AFTER PARTIAL HEPATECTOMY [Abstract]. (Eng.) Brinkman, A.; Katz, N.; Sasse, D.; Jungermann, K. (Biochemisches Institut der Universitat, Hermann-Herder-Str. 7, D-7800 Freiburg i. Br., W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1184; 1977.

4446 METABOLITE COMPARTMENTATION IN ISOLATED LIVER CELLS FROM FED RATS [Abstract]. (Eng.) Brocks, D. G.; Siess, E. A.; Wieland, O. H. (Krankenhaus Munchen-Schwabing, Kolner Platz 1, D-8000 Munchen 40, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1185; 1977.

4447 RIBOSOMAL PROTEIN PHOSPHORYLATION IN EXPERIMENTAL LIVER INJURY [Abstract]. (Eng.) Gressner, A. M. (Medizinischen Fakultat der RWTH, Goethe-str. 27-29, D-5100 Aachen, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1207; 1977.

4448 HEMATOSIDE-ACETYLGALACTOSAMINYLTRANSFERASE ACTIVITY IN THE GOLGI APPARATUS OF D-GALACTOSAMINE-TREATED RAT LIVER [Abstract]. (Eng.) Rossle, M.; Kloust, R.; Decker, K. (Medizinischen Fakultat der Albert-Ludwigs-Universitat, Hermann-Herder-Str. 7, D-7800 Freiburg, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1265-1266; 1977.

4449 THREE-DIMENSIONAL MAPPING OF METABOLIC STATE OF RAT LIVER. EFFECTS OF HIGH AND LOW ALCOHOL CONCENTRATIONS [Abstract]. (Eng.) Quistorff, B.; Chance, B. (Johnson Res. Foundation, Univ. Pennsylvania, Philsdelphia, PA 19174). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1261; 1977.

4450 DEVELOPMENT OF LIVER DAMAGE INDUCED BY D-GALACTOSAMINE STUDIED IN THE ISOLATED PERFUSED RAT LIVER [Abstract]. (Eng.) Rasenack, J.; Nowack, J.; Decker, K. (Medizinischen Fakultat der Universitat, Hermann-Herder-Str. 7, 7800 Freiburg, W. Germany). *Hoppe Seylers Z. Physiol. Chem.* 358(10):1262; 1977.

4451 THE ROLE OF ACETATE IN THE PATHOGENESIS OF THE ACUTE ETHANOL-INDUCED FATTY LIVER IN RATS [Abstract]. (Eng.) Morgan, D. D.; Mendenhall, C. L. (Univ. Cincinnati Medical Center, Cincinnati, OH). *Gastroenterology* 73(5):1235; 1977.

4452 THE EFFECT OF β-GLYCEROPHOSPHATE ON CHOLESTEROL SATURATION AND BILIARY LIPID KINETICS IN NORMAL MAN [Abstract]. (Eng.) McCone, J.; Trotman, B. W.; Soloway, R. D. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Gastroenterology* 73(5):1233; 1977.

4453 EFFECTS OF NICOTINIC ACID ON BILIARY LIPIDS IN MAN [Abstract]. (Eng.) Mok, H. Y. I.; Grundy, S. M. (Veterans Admin. Hosp., La Jolla, CA). *Gastroenterology* 73(5):1235; 1977.

4454 DISPARATE Na^+-REQUIREMENT OF BILE ACID INDOCYANINE GREEN UPTAKE BY ISOLATED HEPATOCYTES [Abstract]. (Eng.) Minder, E.; Paumgartner, G. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Gastroenterology* 73(5):1235; 1977.

4455 KINETICS OF UREA SYNTHESIS BY PERFUSED RAT LIVER [Abstract]. (Eng.) Perez, G. O.; Schiff, E. R.; Rietberg, B.; Owens, B.; Parker, T. (Univ. Miami Sch. Medicine, Miami, FL). *Gastroenterology* 73(5):1238; 1977.

4456 CHARCOAL HEMOPERFUSION (CHP) AND BRAIN NEUROTRANSMITTERS (BNT) IN EXPERIMENTAL LIVER FAILURE [Abstract]. (Eng.) Opolon, P.; Javaudin, L.; Delorme, M. L.; Boschat, M.; Rapin, J. R. (INSERM U 9, 75012 Paris, France). *Gastroenterology* 73(5):1237; 1977.

4457 HEPATIC LIPOPEROXIDATION (HLP) IN RELATION TO AGE AND DIETARY FACTORS IN RATS [Abstract]. (Eng.) Porta, E. A.; Joun, N. S. (J. A. Burns Medical Sch., Honolulu, HI). *Gastroenterology* 73(5):1239; 1977.

4458 EFFECTS OF URSODEOXYCHOLIC ACID ON STEROL METABOLISM IN RATS [Abstract]. (Eng.) Raicht, R. F.; Cohen, B. I. (New York Veterans Admin Hosp., New York, NY). *Gastroenterology* 73(5): 1241; 1977.

4459 THE FRACTIONAL HEPATIC EXTRACTION OF CHOLIC ACID CONJUGATES IN THE CONSCIOUS DOG [Abstract]. (Eng.) Pries, J. M.; Sherman, C. A.; Williams, G. C.; Hanson, R. F. (Dept. Medicine, Univ. Minnesota, Minneapolis, MN). *Gastroenterology* 73(5):1240; 1977.

4460 INHIBITION OF BILIRUBIN CONJUGATION AND INDUCTION OF HYPERBILIRUBINEMIA BY NICOTINIC ACID [Abstract]. (Eng.) Rosental, E.; Thaler, M. M. (Dept. Pediatrics, Univ. California, San Francisco, CA). *Gastroenterology* 73(5):1244; 1977.

4461 THE EFFECT OF SIMULATED RESPIRATORY ACIDOSIS AND ALKALOSIS ON INTRACELLULAR pH AND GLUCONEOGENESIS FROM LACTATE IN THE ISOLATED PERFUSED RAT LIVER [Abstract]. (Eng.) Iles, R. A.; Baron, P. G.; Cohen, R. D. (London Hosp. Medical Coll., London, England). *Clin. Sci. Mol. Med.* 53(3):9P-10P; 1977.

4462 PREVENTION, AUGMENTATION AND REVERSAL OF TAUROLITHOCHOLIC ACID (L) CHOLESTASIS IN THE MONKEY [Abstract]. (Eng.) Strasberg, S. M.; Ilson, R. G. (Dept. Surgery, Univ. Toronto, Toronto, Canada). *Gastroenterology* 73(4):869; 1977.

4463 CHLORPROMAZINE (CPZ) CHOLESTASIS: SITE OF INJURY AND PROTECTIVE EFFECT OF SODIUM TAUROCHOLATE (TC) [Abstract]. (Eng.) Strasberg, S. M.; Ilson, R. G. (Dept. Surgery, Univ. Toronto, Toronto, Canada). *Gastroenterology* 73(4):869; 1977.

4464 EFFECT OF CHRONIC ETHANOL ADMINISTRATION MECHANISMS OF HEPATOTOXICITY TO FOREIGN COMPOUNDS [Abstract]. (Eng.) Joly, J. G.; Yelle, L.; Hetu, C. (Hopital Saint-Luc, Montreal, Quebec, Canada). *Clin. Res.* 25(5):688A; 1977.

4465 ALTERATIONS OF THE ACTIVITIES OF LIVER PLASMA MEMBRANE ENZYMES AND MECHANISM OF SERUM ALKALINE PHOSPHATASE ELEVATION IN CHOLESTASIS OF RAT [Abstract]. (Eng.) Oka, H.; Toda, G. (First Dept. Medicine, Univ. Tokyo, Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):336-337; 1977.

4466 INHIBITION OF HEPATOMA GROWTH IN RATS TREATED WITH PROPYLTHIOURACIL (PTU) [Abstract]. (Eng.) Mishkin, S.; Morris, H. P.; Lenoff, F.; Pollack, R.; Yalovsky, M.; Murthy, P. V. (McGill Univ. Clinic, Montreal, Quebec, Canada). *Clin. Res.* 25(5):688A; 1977.

4467 BILIARY TRANSPORT AND CHOLESTATIC EFFECTS OF AMINO ACIDS (AA) [Abstract]. (Eng.) Preisig, R.; Rennert, O. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Gastroenterology* 73(5):1240; 1977.

4468 PROLINE OXIDASE ACTIVITY AND THE AVAILABILITY OF PROLINE FOR COLLAGEN BIOSYNTHESIS IN LIVERS OF CCl_4-TREATED RATS [Abstract]. (Eng.) Rojkind, M.; Giambrone, M. A.; Ehrinpreis, M. (Albert Einstein Coll. Medicine, Bronx, NY). *Gastroenterology* 73(5):1243; 1977.

4469 THE MECHANISM OF ALTERATION OF LIPID METABOLISM BY PORTACAVAL SHUNT [Abstract]. (Eng.) Reichle, F. A.; Reichle, R. M.; David, J. S. K. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140). *Gastroenterology* 73(5):1243; 1977.

4470 EFFECT OF PARTIAL OR COMPLETE PORTAL DIVERSION ON LIVER MASS AND AMMONIA METABOLISM [Abstract]. (Eng.) Reichle, F. A.; Rao, N. S.; Reichle, R. M.; Chang, K. H. Y. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140). *Gastroenterology* 73(5):1242; 1977.

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4475 COMPARATIVE STUDIES OF ALANINE AND α-AMINOISOBUTYRIC ACID UPTAKE IN LIVER [Abstract]. (Eng.) Edmondson, J. W.; Lumeng, L.; Li, T. K. (Indiana Univ. Sch. Medicine, Indianapolis, IN). *Clin. Res.* 25(4):561A; 1977.

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4477 CLINICAL STUDY OF LIVER BLOOD FLOW IN MAN MEASURED BY ^{133}Xe CLEARANCE AFTER PORTAL VEIN INJECTION [Abstract]. (Eng.) Taylor, I.; Sheriff, S. B.; Smart, R. C. (Royal Hosp., Sheffield, England). *Gut* 18(5):A400; 1977.

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4479 ANTIPYRINE (A) METABOLISM AND BILIARY EXCRETION DURING ISOLATED GUINEA PIG LIVER PERFUSION: EFFECT OF ALCOHOL [Abstract]. (Eng.) Tarnawski, A.; Bogdal, J.; Goszcz, A.; Wilczak, H. (Veterans Admin. Hosp., Columbia, MO). *Gastroenterology* 72(5, Part 2):1178; 1977.

4480 ABNORMAL COLLAGEN IN ALCOHOLIC LIVER INJURY [Abstract]. (Eng.) Feinman, L.; Lue, S.; Lieber, C. S. (Bronx Veterans Admin. Hosp., New York, NY). *Gastroenterology* 72(5, Part 2):1173; 1977.

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4483 EFFECTS OF ALTERED BILE SALT ENTEROHEPATIC CYCLING UPON BILE SALT KINETICS AND BILIARY LIPID COMPOSITION [Abstract]. (Eng.) Motson, R.; Hammerman, K.; Admirand, W.; Way, L. (Dept. Medicine, Univ. California, San Francisco, CA). *Gastroenterology* 72(5, Part 2):1173; 1977.

4484 TREATMENT OF CANINE ACUTE LIVER FAILURE BY HETEROTOPIC LIVER HOMOGRAFT [Abstract]. (Eng.) Ricco, J. B.; Diaz, A.; Franco, D.; Grange, D.; Gigou, M.; Bismuth, H. (INSERM U 17, Hopital Paul-Brousse, 14, avenue Paul-Vaillant-Couturier, 94800 Villejuif, France). *Digestion* 15(5):444-445; 1977.

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4486 BIOCHEMICAL CHANGES UNDER THE EFFECT OF CARBON TETRACHLORIDE INTOXICATION. (Eng.) El-Dessoukey, E. A.; Awadallah, R.; El-Attar, S. (Natl. Res. Center, Industrial Medicine, Dokki, Cairo, Egypt). *Z. Ernaehrungswiss.* 16(4): 217-222; 1977.

See also, 4347, 4382, 4413, 4520, 4540, 4564, 4647, 4805, 4806, 4839, 4929, 4945, 4961, 4966, 5004.

SECRETION AND METABOLISM

Intestine

4487 EVIDENCE FOR THE EXISTENCE OF A COUNTER-CURRENT EXCHANGER IN THE SMALL INTESTINE IN MAN. (Eng.) Hallback, D. A.; Hulten, L.; Jodal, M.; Lindhagen, J.; Lundgren, O. (Dept. Physiology, Fack, 400 33 Goteborg 33, Sweden). *Gastroenterology* 74(4):683-690; 1978.

Fifty-one patients undergoing surgery for colorectal carcinoma, colitis, or obesity were studied by washout of intra-arterially injected ^{85}Kr or by cryoscopy of the tissue osmolality in the intestinal villi when exposed to electrolyte solutions to investigate the possibility that a countercurrent exchanger exists in the human small intestine. The elimination of ^{85}Kr from an isolated segment of the small bowel in 40 patients exhibited an initial very rapid component, which probably reflects the extravascular shunting in the exchanger of the injected radioactive tracer. In the 11 patients whose intestinal mucosa were exposed to an isotonic electrolyte solution containing glucose, an osmolality gradient was observed from the tip to the base of the villi, the tips having an osmolality of 700 mOsm/kg water. It is suggested that the hyperosmolality observed is created by the exchanger acting as a countercurrent multiplier.

4488 DIFFERENTIATION AND AGING OF THE RAT INTESTINAL MUCOSA. II. MORPHOLOGICAL, ENZYME HISTOCHEMICAL AND DISC ELECTROPHORETIC ASPECTS OF THE AGING OF THE SMALL INTESTINAL MUCOSA.

(Eng.) Hohn, P.; Wagner, R. (Inst. for Pathology, Johannes Gutenberg Univ., Mainz, W. Germany). *Mech. Ageing Dev.* 7(3):217-226; 1978.

To study the age-dependent loss of function in the intestinal mucosa, the small intestinal mucosa of 4-month-old (adult) and 30-month-old (senile) male Wistar rats was examined histologically by scanning electron microscopy, autoradiography, enzyme histochemistry, and disc electrophoresis. Specimens were obtained at 0800, 1200, 1600, and 2400 hr. By light microscopy, a pronounced atrophy of the duodenal mucosa (approximately a 25% decrease in villous height) was seen in the senile animals as compared to the controls. In the senile rats, villous atrophy was detected histologically, and an irregular architecture was seen in scanning electron microscopy. These age-dependent changes were limited to the proximal small intestine. In both 4-month-old and 30-month-old rats, ^{3}H-thymidine incorporation was restricted to the lower 2/3 of the crypts in the intestinal epithelium 1 hr after precursor administration, indicating that the length relation between the proliferation and differentiation compartments is identical in young and old animals. No appreciable difference between 4-month- and 30-month-old rats was demonstrable by enzyme histochemistry, but a marked loss in activity of alkaline and acid phosphatases in the duodenum of senile rats was shown in the disc electrophoretogram for specimens taken at all times of day. This loss of enzyme activity is attributed solely to the diminished total number of enterocytes in old age.

4489 THE MAGNITUDE AND DISTRIBUTION OF THE ACID MICROCLIMATE IN PROXIMAL JEJUNUM AND ITS RELATION TO LUMINAL ACIDIFICATION.

(Eng.) Lucas, M. L.; Blair, J. A. (Dept. Chemistry, Univ. Aston in Birmingham, Birmingham B4 7ET, England). *Proc. R. Soc. Lond.* [*Biol.*] 200(1138):27-41; 1978.

The change in surface pH along the length of the rat and human small intestine and the response of the acid microclimate to various physiologic conditions were investigated and then correlated with the luminal acidification that occurs in the proximal jejunum. The pH of the intestinal surface was measured in rat jejunum and ileum and in human jejunal biopsy samples by a sensitive glass pH-electrode. In the absence of glucose in the incubation medium, pH values were between 6.5 and 6.7 with slightly more acidic values in the jejunum, indicating a glucose-independent maximum for surface pH around the mid-portion of the small intestine. In the presence of 10 mM glucose, there was maximum acidity in the duodenum and a distally increasing surface pH. Values in the presence of glucose were significantly different (more acidic) from the glucose-free values except in the distal ileum, indicating a glucose-sensitive component of surface pH maintenance. The low surface pH was less acid in the presence of 10 mM mucosal aminophylline or ouabain. Various intestinal preparations were used to investigate the site of acidification and simultaneously mucosal lactic and pyruvic acid production were measured. It is concluded that the mucosal cells are the site of acidification when they are correctly aligned, as they would be in the intact villus, and that lactic and pyruvic acid production are not involved in the process. The ouabain and aminophylline-inhibited serosal acidification seen in everted intestinal sacs was less than 2% of that occurring mucosally. It may be accounted for solely by back diffusion of hydrogen ion from the mucosal surface.

4490 CHYLOMICRON APOPROTEIN LOCALIZATION WITHIN RAT INTESTINAL EPITHELIUM: STUDIES OF NORMAL AND IMPAIRED LIPID ABSORPTION.

(Eng.) Glickman, R. M.; Kilgore, A.; Khorana, J. (Columbia Univ. Coll. Physicians and Surgeons, New York, NY). *J. Lipid Res.* 19(2):260-268; 1978.

Monospecific antisera were produced to two chylomicron apoproteins (apoB, apoA-I) and utilized for indirect immunofluorescent localization of these apoproteins within rat intestinal epithelium during normal and impaired lipid absorption. Isolated intestinal epithelial cells prepared after different periods of lipid absorption from *in situ* intestinal segments revealed a rapid increase in fluorescence for both apoproteins that filled the entire apical portion of the cell. Prolonged lipid absorption for as long as 5 hr demonstrated sustained immunofluorescence and gave no indication of a depletion of the intestinal mucosa for either apoprotein during normal lipid absorption. [^{3}H]Leucine incorporation into mesenteric lymph chylomicron apoproteins showed a linear decrease in specific activity of total chylomicron protein as well as apoB over 4 hr of a continuous lipid infusion, indicating sustained active apoprotein synthesis during prolonged lipid absorption. In animals in which protein synthesis was inhibited by the administration of acetoxycycloheximide (0.25-0.5 mg/kg, i.p.), fluorescence for both apoproteins was present early in the course of lipid absorption; however, at 60 min after the onset of lipid absorption, fluorescence for both apoproteins was absent. Fluorescence for both apoproteins returned during the recovery of protein synthesis. These studies confirm previous results that had localized two chylomicron apoproteins within intestinal epithelial cells. The present studies extend these observations and disclose a rapid and sustained synthesis of these apoproteins during prolonged chylomicron formation. During an experimental condition of impaired protein synthesis, there was a marked reduction in the mucosal content of both apoA-1 and apoB. These results are the first demonstration of impaired mucosal apoprotein synthesis during an experimental model of impaired lipid absorption.

4491 EFFECT OF CORTISONE OR L-TRIIODOTHYRONINE ADMINISTRATION TO PREGNANT RATS ON THE ACTIVITY OF FETAL INTESTINAL DISACCHARIDASES AND LYSOSOMAL ACID β-GALACTOSIDASE.

(Eng.) Jumawan, J.; Celano, P.; Horowitz, C.; Lau, H.; Koldovsky, O. (Children's Hosp. Philadelphia, Philadelphia, PA). *Biol. Neonate* 32(3/4):211-217; 1977.

To clarify factors influencing the expression of the normal developmental pattern, the effects of cortisone acetate (10 or 50 mg/100 g/day, i.m.) or *L*-triiodothyronine (T_3, 20 or 50 μg/100 g/day, s.c.) administration to pregnant Charles River rats on fetal jejunal and ileal sucrase, maltase, lactase, and acid-β-galactosidase activities were studied. The injections were administered on days 16-21 of pregnancy and the fetuses taken by cesarean section on the morning of day 22; the fetuses were killed by decapitation, and the jejuna and ilea of fetuses from one horn were pooled and prepared for assay. Cortisone administration (10 or 50 mg/kg/day) markedly decreased maternal weight gain (38.2 ± 3.1 and 20.2 ± 8.3 g, resp.) compared to controls (70.8 ± 4.3 g for untreated and 61.4 ± 1.4 g for NaCl-injected animals), while T_3 treatment (20 or 50 μg/kg/day) reduced weight gain to a lesser extent (59.3 ± 9.8 and 57 g, resp.) compared to the untreated or NaOH-treated (63.8 ± 4.2 g) controls. Litter weight was notably affected only by the higher cortisone dose (32.5 ± 4.2 g versus 55.4 ± 4.1 and 50.4 ± 1.3 g for the untreated and NaCl-treated controls, resp.). The higher cortisone dose decreased both ileal and jejunal weights (2.02 ± 0.09 and 3.92 ± 0.21 mg protein, resp.) compared to untreated (2.48 ± 0.09 and 5.22 ± 0.30 mg protein, resp.) and NaCl controls (2.62 ± 0.13 and 4.83 ± 0.22 mg protein, resp.), but the lower cortisone dose affected only the jejunum (3.81 ± 0.24 mg protein). The lower T_3 dose increased ileal weight (5.55 ± 0.47 mg protein) compared to untreated and NaOH (4.08 ± 0.45 mg protein) controls. There were no significant differences in the activity of any enzyme among the three control groups in either tissue, except that NaCl treatment increased the ileal lactase specific activity by 43% and total activity (in μmol glucose/hr/ileum) from 4.23 ± 0.26 (untreated controls) to 6.39 ± 0.63. Sucrase and maltase specific and total activities were markedly increased in both the jejunum and ileum by both hormone treatments in a dose-dependent manner. Cortisone acetate, but not T_3, increase lactase specific and total activities. Both T_3 doses markedly decreased jejunal acid-β-galactosidase specific and total activities, whereas cortisone had no effect. The administration of hormones to pregnant mothers is able to influence the intestinal enzyme activity of their offspring *in utero*.

4492 THERMOGRAPHIC ASSESSMENT OF INTESTINAL VIABILITY FOLLOWING ISCHEMIC DAMAGE.

(Eng.) Moss, A. A.; Kressel, H. Y.; Brito, A. C. (Dept. Radiology, Univ. California, San Francisco, CA 94143). *Invest. Radiol.* 13(1):16-20; 1978.

The use of thermography in assessing the viability of ischemic intestine that has been revascularized was investigated in dogs. A segment of small bowel was made ischemic by arterial occlusion, and the ischemia was maintained for 2.5 hr (ischemic, viable bowel) or 8 hr (ischemic, nonviable bowel) before circulation was restored. Thermograms and surface temperature measurements of exposed ischemic and nonischemic bowel segments were obtained before and every 5 min after revascularization. Thermograms of segments revascularized after 2.5 hr of ischemia demonstrated reactive hyperemia and a 1- to 4-degree increase in surface temperature compared to normal surrounding bowel. No hyperemic response was seen in bowel segments that were ischemic for 8 hr. These results indicate that thermograms can document reactive hyperemia of an exposed ischemic bowel that has been successfully revascularized and may be an important aid in assessing bowel viability during surgery.

4493 EXPERIMENTAL PRODUCTION OF DIFFUSE COLITIS IN RATS.

(Eng.) MacPherson, B.; Pfeiffer, C. J. (Faculty Medicine, Memorial Univ. Newfoundland, St John's, Newfoundland, Canada). *Digestion* 17(2):135-150; 1978.

Two modifications of the acetic acid technique (serosal application and intraluminal application) were used in 450 male Sprague-Dawley rats in an effort to develop colonic mucosal lesions that were located in the distal colon, readily reproducible, of diffuse character, and exhibited features histopathologically similar to human disease forms. The various concentrations of acetic acid (10, 25, 35, or 50%) tested yielded a dose-response relationship. The optimal concentration of acetic acid for serosal application (35%) produced the desired lesions in 100% of the treated animals but caused production of vast amounts of fibrous connective tissue exudate on the visceral aspect of the serosa resulting in adhesions encompasssing the adjacent viscera and fistulous tracts between the colon and small bowel segments. Gross dilation of the distal colon resembling megacolon was also observed. The optimal intraluminal application (10%) was equally effective at inducing colonic mucosal lesions without the adverse side-effects. The histopathological features of the chemically induced colitis were diffuse ulceration of the distal colon, decreased colonic mucus secretion, the formation of pseudopolyp-like structures, increase in intestinal crypt depth (474 ± 1.58 μm versus a normal value of 229 ± 1.19 μm), and acute, edematous, nonspecific, transmural inflammation. A return to normal architecture was observed during healing following 10% intraluminal acetic acid treatment, whereas most other treatments caused the formation of fibrous scar tissue. The experimental lesions were not observed to reactivate during 60 days of follow-up. It is concluded that intraluminal application was a superior technique for induction of experimental colitis.

4494 PROTECTIVE EFFECT OF METRONIDAZOLE IN EXPERIMENTAL ULCERATIVE COLITIS. (Eng.) Onderdonk, A. B.; Hermos, J. A.; Dzink, J. L.; Bartlett, J. G. (Boston Veterans Admin. Hosp., 150 S. Huntington Ave., Boston, MA 02130). *Gastroenterology* 74(3):521-526; 1978.

Carrageenan-induced colitis in guinea pigs was used as a model to determine fecal flora changes and response to antimicrobial probes during the evolution of colitis. Mean coliform concentrations increased from $10^{2.7}$ to $10^{7.4}$/g during the initial stages of colonic ulceration produced by 5% carrageenan (weight/volume) as drinking fluid. Pretreatment of carrageenan recipients with antimicrobials directed against coliforms reduced the concentrations of these organisms, but failed to attenuate the disease process. On the other hand, pretreatment with metronidazole (2 mg/ml in drinking water) prevented carrageenan-induced colitis in 12 of 15 animals. Delayed treatment with metronidazole until after colitis was established showed no salutory benefits. These results suggest that anaerobic bacteria play a role in the initial events of carrageenan-induced colitis in the guinea pig model.

4495 STUDY OF THE INTESTINAL MUCOSA IN THE PRESENCE OF EXPERIMENTALLY INDUCED ATRESIA. (Eng.) Pospisilova, V.; Pavlikova, D.; Terstianska, G. (Faculty Medicine, Comenius Univ., Bratislava, Czechoslovakia). *Fol. Morphol.* 25(4): 329-332; 1977.

4496 REABSORPTION OF DIGESTIVE ENZYMES: PLAYING WITH POISON. (Eng.) Diamond, J. M. (Univ. California Medical Center, Los Angeles, CA). *Nature* 271(5641):111-112; 1978.

4497 THE SMALL INTESTINE IN OLD MICE: GROWTH, ALKALINE PHOSPHATASE AND DISACCHARIDASE ACTIVITIES, AND DEPOSITION OF AMYLOID. (Eng.) Moog, F. (Dept. Biology, Washington Univ., St. Louis, MO 63130). *Exp. Gerontol.* 12(5/6):223-235; 1977.

4498 RELATION OF PEROXIDASE ACTIVITY IN GUT MUCOSA TO INFLAMMATION. (Eng.) Smith, J. W.; Castro, G. A. (Univ. Texas Medical Sch., Houston, TX 77025). *Am. J. Physiol.* 234(1):R72-R79; 1978.

4499 DIATRIZOATE ENEMAS: FACTS AND FALLACIES OF COLONIC TOXICITY. (Eng.) Wood, B. P.; Katzberg, R. W.; Ryan, D. H.; Karch, F. E. (Univ. Rochester Medical Center, 601 Elmwood Ave., Rochester, NY 14642). *Radiology* 126(2):441-444; 1978.

4500 INTESTINAL BRUSH BORDER ENZYME RELEASE IN RATS [Abstract]. (Eng.) Eloy, P.; Mirhom, R.; Raul, F.; Vaultier, J. P.; Grenier, J. F. (INSERM, U-61, Avenue Moliere, Strasbourg Hautepierre 67200, France). *Digestion* 16(1/2): 209-210; 1977.

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4502 FORMATION OF LITHOCHOLIC ACID FROM CHENODEOXYCHOLIC ACID AND URSODEOXYCHOLIC ACID BY INTESTINAL BACTERIA [Abstract]. (Eng.) Fedorowski, T.; Salen, G.; Mosbach, E. H. (East Organge Veterans Admin. Hosp., East Orange, NJ). *Gastroenterology* 73(5):1220; 1977.

4503 INTESTINAL BYPASS IN RATS. (Eng.) Viddal, K. O.; Nygaard, K. (Natl. Hosp. Norway, Oslo, Norway). *Chir. Gastroenterol.* 11(2):213-215; 1977.

4504 HISTOGENESIS OF COLON GLANDS DURING POSTNATAL GROWTH. (Eng.) Maskens, A. P. (Clinique Saint-Michel, Rue de Lantsheere 19, 1040 Brussels, Belgium). *Acta Anat.* 100(1):17-26; 1978.

4505 INTESTINAL ANTIBODIES. (Eng.) Walker, W. A.; Isselbacher, K. J. (Harvard Medical Sch., Boston, MA). *N. Engl. J. Med.* 297(14):767-773; 1977.

4506 ORIGIN OF INTESTINAL β-GLUCURONIDASE IN GERMFREE, MONOCONTAMINATED AND CONVENTIONAL RATS. (Eng.) Rod, T. O.; Midtvedt, T. (Rikshospitalet, Oslo, Norway). *Acta Pathol. Microbiol. Scand.* [*B*] 85(4):271-276; 1977.

4507 EFFECT OF ADRENALECTOMY (ADX) ON PHOSPHOLIPID BIOSYNTHESIS IN RAT INTESTINE [Abstract]. (Eng.) O'Doherty, P. J. A. (Vancouver General Hosp., Vancouver, British Columbia, Canada). *Clin. Res.* 25(5):689A; 1977.

4508 BIOSYNTHESIS OF GLYCOPROTEINS ASSOCIATED WITH ENZYMIC ACTIVITIES BY HUMAN INTESTINAL MUCOSA IN ORGAN CULTURE [Abstract]. (Eng.) Kedinger, M.; Hauri, H. P.; Haffen, K.; Grenier, J. F.; Hadorn, B. (INSERM, U-61, Avenue Moliere, 67200 Strasbourg, France). *Digestion* 16(1/2): 212; 1977.

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4510 ANION-STIMULATED ATPase ACTIVITY OF INTESTINAL ALKALINE PHOSPHATASE [Abstract]. (Eng.) Humphreys, M. H.; Watson, J. B.; Kaysen, G. A. (San Francisco General Hosp., San Francisco, CA). *Clin. Res.* 26(2):110A; 1978.

4511 STIMULATION OF INTESTINAL ORNITHINE DECARBOXYLASE (OD) BY EPIDERMAL GROWTH FACTOR (EGF) [Abstract]. (Eng.) Feldman, E. J.; Aures-Fischer, D.; Grossman, M. I. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Clin. Res.* 26(2):109A; 1978.

4512 IMMUNOREACTIVE SECRETIN IS RELEASED INTO THE DUODENAL JUICE IN MAN [Abstract]. (Eng.) Hanssen, L. E.; Hanssen, K. F.; Myren, J. (Ulleval Hosp., Oslo, Norway). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):493; 1977.

4513 RELEASE OF SECRETIN IN RELATION TO VARIATIONS IN DUODENAL pH [Abstract]. (Eng.) Fahrenkrug, J.; Schaffalitzky de Muckadell, O.; Rune, S. J. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Hepatogastroenterol. (Stuttg.)* 24(6):486; 1977.

4514 ELECTRON-MICROSCOPIC STUDIES OF THE MUCOSA OF THE COLON IN RATS WITH CHRONIC ULCEROUS HAEMORRHAGIC COLITIS [Abstract]. (Eng.) Djadjova-Boneva, M.; Stoyanov, D. (Inst. Gastroenterology, Medical Acad., Sofia, Bulgaria). *Dokl. Bolg. Nauk* 30(10):1511-1514; 1977.

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4516 CIRCADIAN RHYTHM IN THE ORNITHINE DECARBOXYLASE ACTIVITY OF RAT SMALL INTESTINE [Abstract]. (Eng.) Fujimoto, M.; Kanaya, A.; Nakabou, Y.; Hagihira, H. (Sch. Medicine, Tokushima Univ., Kuramoto-cho, Tokushima, Tokushima 770, Japan). *J. Biochem.* 83(1):237-242; 1978.

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4518 DISACCHARIDASES [sic] LEVELS IN THE SMALL INTESTINE OF UNDERNOURISHED RATS [Abstract]. (Eng.) Galvao, L. C.; do Rosario Leme Brasil, M.; Collares, E. F.; Soares, F. C. (No affiliation given). *Arq. Gastroenterol.* 14(3): 157; 1977.

4519 BINDING OF LONG-CHAIN FATTY ACIDS (FA) BY RAT INTESTINAL MICROVILLUS MEMBRANES (MVM) [Abstract]. (Eng.) Kessler, J. I.; Kvapil, V.; Kurylo, M. (McGill Univ. Clinic, Montreal, Quebec, Canada). *Clin. Res.* 25(5):688A; 1977.

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ULCERS IN THE RECTAL MUCOUS MEMBRANE OF GUINEA-PIGS. (Eng.) Reeve, D. R. E. (London Hosp. Medical Coll., Turner St., London E1 2AD, England). *J. Anat.* 125(2):337-348; 1978.

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See also, 4288, 4296, 4305, 4316, 4402, 4407, 4415, 4539, 4540, 4546, 4552, 4555, 4599, 4683, 4779, 4794, 5013.

GENERAL

4527 EFFECT OF ORAL PANCREATIC ENZYMES ON THE COURSE OF CHOLERA IN PROTEIN-DEFICIENT VERVET MONKEYS. (Eng.) Gyr, K.; Felsenfeld, O.; Zimmerli-Ning, M. (Kantonsspital, CH-4004 Basel, Switzerland). *Gastroenterology* 74(3):511-513; 1978.

The effect of pancreatic extract on the course of cholera infection in protein-deficient vervet monkeys (*Cercopithecus ethiops*) was studied. Eleven animals were made protein deficient by a protein-free diet. Their intestinal pancreatic enzyme concentration decreased as they became protein depleted. These animals and four controls on a normal diet were then challenged with *Vibrio cholerae*. Immediately after challenge, six protein-deficient monkeys were given a highly purified pancreatic extract (500 mg/day), and the other five protein-deficient animals received heat-inactivated pancreatic extract. Pancreatic extract significantly reduced the severity and duration of diarrhea in the treated animals so that they resembled the controls. The period of fecal excretion of vibrios was prolonged in the monkeys that received inactivated pancreatic extract. In addition, the response of intestinal antibody titers to cholera toxin was also significantly lower in this latter group ($p<0.01$). These observations suggest that exocrine pancreatic secretion is involved in the local defense mechanism against cholera during protein deficiency.

4528 PATHOGENIC EFFECT OF ENTEROTOXIGENIC Escherichia coli AND Escherichia coli CAUSING INFANTILE DIARRHOEA. (Eng.) Polotsky, Yu. E.; Dragunskaya, E. M.; Seliverstova, V. G.; Avdeeva, T. A.; Chakhutinskaya, M. G.; Ketyi, I.; *et al.* (USSR Acad. Medical Sciences, Kirovsky prospekt 69/71 Leningrad P-22, 197022, USSR). *Acta Microbiol. Acad. Sci. Hung.* 24(3):221-236; 1977.

Macroscopic and light and electron microscopic alterations were investigated in ligated rabbit intestinal loops challenged with five standard enterotoxigenic *Escherichia coli* (ETEC) strains and 23 enteropathogenic *E. coli* (EEC-I) strains freshly isolated from infantile enteritis cases. Only two of the EEC-I, 026:K60:H11 strains produced enterotoxin. Their living cultures, sterile filtrates of the fluid medium, and ultrasonic lysates of the bacteria resulted in pronounced hypersecretion of the intestinal epithelium followed by fluid accumulation and loop dilatation. These two *E. coli* strains, similar to other loop-negative EEC-I strains, were able to penetrate into the intestinal epithelium. In contrast to the standard ETEC strains, the EEC-I bacteria, adhered to the brush border, intruded into the microvilli, multiplied on the outer epithelial cell membrane (making close contact with it and causing shedding of microvilli), penetrated into enterocytes (becoming enclosed in membrane-bound phagosome-like vacuoles), appeared in the lamina propria, and elicited mild focal polymorphonuclear infiltration. Many features of enteropathogenic *E. coli* await elucidation.

4529 EFFECT OF SECRETOGOGUES ON MUCOSAL BLOOD FLOW IN THE ANTRUM AND CORPUS OF THE STOMACH. (Eng.) Taylor, T. V.; Pullan, B. R.; Goddard, J.; Torrance, B. (Royal Infirmary, Manchester, England). *Gut* 19(1):14-18; 1978.

The effect of increasing doses of secretagogues on mucosal blood flow to the antrum and corpus was studied in Wistar rats, using an indicator fractionation technique in which ^{86}Cl-Rb is employed. Antral and corpus flow rates were determined in response to increasing doses of pentagastrin (6-50 μg/kg) and histamine (0.08 mg/kg), and the effect of vagotomy was determined. With progressive stimulation, the antral corpus flow ratio increased with both stimulants; however, vagotomy and norepinephrine reduced blood flow in both areas of mucosa; norepinephrine reduced the flow rates to approximately 60% of the physiological basal flow. It is concluded that the antrum, as well as the corpus, actively responds to secretory stimulants by an increase in mucosal blood flow, and support is provided for the theory that the antrum plays an active role in the control of parietal cell blood flow and secretion.

4530 SELECTIVE TRANSCATHETER EMBOLIZATION OF THE UPPER GASTROINTESTINAL TRACT: AN EXPERIMENTAL STUDY. (Eng.) Castaneda-Zuniga, W. R.; Jauregui, H.; Rysavy, J.; Amplatz, K. (Univ. Minnesota Hosp., 420 Delaware St. S.E., Minneapolis, MN 55455). *Radiology* 127(1):81-83; 1978.

The value of transcatheter gastric embolization using Ivalon shavings was tested in three groups of dogs. The left gastric artery and splenic branches (the short gastric and left gastroepiploic arteries) were embolized in group I, the left gastric artery in group II, and the splenic branches in group III. Infarctions of the gastric mucosa occurred only in group 1. Ischemic ulcers developed in three of the five dogs in group I and in one of the three dogs in group II. Since small particles may reach the capillary bed beyond the level of collateralization, embolization for the control of gastrointestinal hemorrhage can only be performed safely if particles of 0.3 mm or larger are used.

4531 VIP RELEASE IN INTESTINAL ISCHAEMIA [Abstract]. (Eng.) Modlin, I. M.; Bloom, S. R.; Mitchell, S. J. (Royal Postgraduate Medical Sch., London W12, England). *Gut* 18(11):A963; 1977.

4532 MATERNAL IMMUNITY TO Giardia IS PASSIVELY TRANSFERRED TO SUCKLING NEWBORN MICE [Abstract]. (Eng.) Stevens, D. P.; Frank, D. M. (Dept. Medicine, Case Western Reserve Univ., Cleveland, OH). *Clin. Res.* 25(4):609A; 1977.

4533 THE ACTIVITY OF A BENZOTHIOPYRANOINDAZOLE (IA-4 N-OXIDE) AGAINST Schistosoma mansoni INFECTION IN RHESUS MONKEYS. (Eng.) Reid, W. A.; Loizeaux, P. S.; Reardon, M. J. (Walter Reed Army Inst. Res., Washington, DC 20012). *Am. J. Trop. Med. Hyg.* 26(5, Part 1):937-943; 1977.

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4535 IMMUNIZATION WITH Shigella dysenteriae TYPE 1: EVALUATION OF ANTITOXIC IMMUNITY IN PREVENTION OF EXPERIMENTAL DISEASE IN RHESUS MONKEYS (Macaca mulatta). (Eng.) McIver, J.; Grady, G. F.; Formal, S. B. (State Lab. Inst., 305 South St., Boston, MA 02130). *J. Infect. Dis.* 136(3):416-421; 1977.

4536 BENEFICIAL EFFECT OF OMENTAL WRAPPING OF UNSAFE INTESTINAL ANASTOMOSES: AN EXPERIMENTAL STUDY IN DOGS. (Eng.) Katsikas, D.; Sechas, M.; Antypas, G.; Floudas, P.; Moshovos, K.; Gogas, J.; *et al.* (King Paul's Hosp., Athens, Greece). *Int. Surg.* 62(8):435-437; 1977.

4537 EVIDENCE FOR A COMMON EVOLUTIONARY ORIGIN OF GASTRIN AND CHOLECYSTOKININ. (Eng.) Larsson, L. I.; Rehfeld, J. F. (Inst. Medical Biochemistry. Univ. Aarhus, DK-8000 Aarhus C, Denmark). *Nature* 269(5626):335-338; 1977.

4538 NEW METHOD OF OBTAINING CINCHOPHEN ULCER IN DOGS. (Eng.) Nagamachi, Y. (1407 Amagawa-Ooshima, Apt. 5-104, Maebashi, Gunma-Ken 379-21, Japan). *Am. J. Dig. Dis.* 22(9):761-768; 1977.

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4540 ALKYLATED PURINES IN THE DNA OF VARIOUS RAT TISSUES AFTER ADMINISTRATION OF 1,2-DIMETHYLHYDRAZINE. (Eng.) Likhachev, A. J.; Margison, G. P.; Montesano, R. (N. N. Petrov Res. Inst. Oncology, 68, Leningradskaya St., Posjelok Pesochny-2, Leningrad 188646, USSR). *Chem. Biol. Interact.* 18(2):235-240; 1977.

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4543 APPLICATION OF METAL LABELED ANTIBODY METHOD AND A CONSIDERATION OF THE FIXATIVES SUITABLE FOR IMMUNOHISTOCHEMISTRY STUDY. (Eng.) Yamamoto, N. (Sch. Medicine, Kitasato Univ., Sagamihara, Kanagawa 228, Japan). *Acta Histochem. Cytochem.* 10(2):246-252; 1977.

4544 SYSTEMIC PROTECTION AGAINST RADIATION. III. INCREASED INTESTINAL RADIORESISTANCE IN RATS FED A FORUMULA-DEFINED DIET. (Eng.) Pageau, R.; Bounous, G. (Centre Hospitalier Universitaire, Universite de Sherbrooke, Sherbrooke, Quebec, Canada). *Radiat. Res.* 71(3):622-627; 1977.

4545 PROTECTION AGAINST CHALLENGE WITH Escherichia coli HEAT-LABILE ENTEROTOXIN BY

IMMUNIZATION OF RATS WITH CHOLERA TOXIN/TOXOID. (Eng.) Pierce, N. F. (Baltimore City Hosp., Baltimore, MD). *Infect. Immun.* 18(2):338-341; 1977.

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4552 EFFECTS OF DIQUAT ON THE GASTROINTESTINAL TRACT OF RATS. (Eng.) Crabtree, H. C.; Lock, E. A.; Rose, M. S. (Imperial Chemical Industries Ltd., Alderly Park, Macclesfield, Cheshire SK10 4TJ, England). *Toxicol. Appl. Pharmacol.* 41(3):585-595; 1977.

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4554 GASTRO-INTESTINAL CANNULATION IN PIGS: A SIMPLE TECHNIQUE ALLOWING MULTIPLE REPLACEMENTS. (Eng.) Decuypere, J. A.; Vervaecke, I. J.; Henderickx, H. K.; Dierick, N. A. (Lab. Nutrition and Hygiene, State Univ. Ghent, Bosstraat, 1, B-9230 Melle, Belgium). *J. Anim. Sci.* 45(3):463-468; 1977.

4555 ENHANCEMENT OF RADIATION EFFECT ON MOUSE INTESTINAL CRYPT SURVIVAL BY TIMING OF 5-FLUOROURACIL ADMINISTRATION. (Eng.) Ho, E.; Coffey, C.; Maruyama, Y. (Univ. Kentucky Medical Center, Lexington, KY). *Radiology* 125(2):531-532; 1977.

See also, 4388, 4770, 4905.

DIAGNOSTIC PROCEDURES

4556 THE USE OF A NEW METHOD FOR DETERMINING THE DUODENOGASTRIC AND JEJUNOGASTRIC REFLUX FOLLOWING GASTRIC SURGERY. PRELIMINARY REPORT. (Ger.) Lohlein, D.; Reichelt, H. G.; Hundeshagen, H.; Pichlmayr, R. (Medizinische Hochschule, Karl-Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *Chirurg* 48(9):588-591; 1977.

Preliminary results obtained with sequential hepatobiliary scintigraphy with ^{99m}Tc in the demonstration of duodenogastric and jejunogastric reflux following gastric surgery are presented. Following the i.v. injection of ^{99m}Tc, scans were taken at 5-min intervals during a 30-min period. The scintigraphy revealed marked differences from the x-ray contrast findings. While the x-ray method revealed marked duodenogastric reflux in 9/10 patients who underwent Billroth I gastric resection, the sequential scintigraphy showed fasting reflux in 1 patient only, and postprandial reflux in another patient after a test meal. Pronounced jejunogastric reflux was found in all patients who underwent Billroth II resection. Accumulation of radioactivity in the gastric stump was not observed following gastrojejunostomy with Roux-en-Y loop. The x-ray contrast investigation showed marked reflux in all 10 patients examined 1 week after selective proximal vagotomy, while sequential scintigraphy revealed marked reflux in only 1 patient who also underwent pyloroplasty, and only slight concentration of radioactivity in the stomach in 2 other patients. No duodenal regurgitation was seen in the other seven patients. Marked reflux was seen in two of these seven patients following a test meal. The findings indicate that this technique is especially suitable for the study of reflux following gastric surgery.

4557 THE CLINICAL VALUE OF AN ORAL TEST OF PANCREATIC FUNCTION WITH FLUORESCEIN DILAURATE. (Ger.) Kaffarnik, H.; Klimkeit, P.; Zofel, P.; Otte, U.; Meyer-Bertenrath, J. G. (Med. Poliklinik, Universitat Marburg, D-3550 Marburg/Lahn, W. Germany). *Munch. Med. Wochenschr.* 119(45):1467-1470; 1977.

The diagnostic value of an exocrine pancreas function test with orally administered fluorescein dilaurate was studied. Exocrine insufficiency of the pancreas is indicated by decreased splitting of the ester substrate and thus diminished excretion of fluorescein in the 24-hr urine. Unesterified fluorescein was used to ascertain the standard excretion of fluorescein (=100%). The relation of test excretion to standard excretion was expressed as a percentage. Values below 20% in the 24-hr or 10-hr urine were pathological, averaging 9.7% in patients with carcinoma of the pancreas and 13.5% in patients with other pancreatopathies, versus about 30% and higher in normal subjects. Values between 20% and 30% are questionable as to interpretation. False-positive test values were obtained in 5.6% and false negative findings in 1.3% of all cases. In view of its simplicity and the low frequency of false-negative results, the oral fluorescein dilaurate test is recommended as a screening method for pancreatic function.

4558 DEMONSTRATION OF THE HEPATIC VEINS BY ECHOTOMOGRAPHY. (Fre.) Taboury, J.; Tubiana, J. M.; Monnier, J. P. (Hopital Saint-Antoine, rue du Fg St-Antoine, F 75571 Paris Cedex 12, France). *Nouv. Presse Med.* 6(34): 3069-3078; 1977.

Provided that a rigorous protocol is adopted, exploration of the hepatic veins by grey-scale echotomography is always possible. The echotomogram of Budd-Chiari syndrome is characterized by hypertrophy of the caudate lobe (anterioposterior compression of the inferior vena cava) and disappearance of the normal suprahepatic venous network. The disposition of the suprahepatic veins is modified, and suprahepatic veins are absent in the pathological parenchymatous zones in hepatoma, liver metastases, hydatid cyst, and polycystosis of the liver. In liver cirrhosis, the walls of the veins are highly irregular and sinuous, or the vessels are very small (at the limit of resolution of the echotomography). The findings indicate that echotomography of the hepatic veins should be integrated into every echotomographic study of the liver (parenchyma, biliary tract, portal system, and inferior vena cava). The method is harmless, rapid, reproducible, and inexpensive.

4559 THE USE OF LIVER-SPLEEN SCAN FOR THE DIAGNOSIS OF CONGENITAL INTRAHEPATIC CYSTS OF THE BILE DUCT (M. CAROLI). (Ger.) Biersack, H. J.; Ebinger, H.; Kutz, K.; Siedeck, W.; Janson, R.; Lindstaedt, H.; *et al.* (Institut fur klinische und experimentelle Nuklearmedizin, Universitat Bonn, Bonn, W. Germany). *Roentgenblaetter* 29(6):289-293; 1976.

Liver-spleen scan with ^{99m}Tc sulfur colloid was performed in two 32-yr-old men with congenital intrahepatic cysts of the bile duct (Caroli's disease). The hepaticographic findings were compatible with, but not typical of, Caroli's disease in both cases. The liver-spleen scans revealed marked changes, such as hepatomegaly (in one case), atypical liver configuration with enlargement of the left hepatic lobe, and splenomegaly with increased colloid fixation. It was possible to localize exactly the intrahepatic cysts on the basis of the parenchymal storage defects. Additional ^{131}I-bromosulfon scintigraphy, performed in one case, proved to be a simple method for determining the patency of the bile ducts. The observations indicate the usefulness of preoperative and postoperative scintigraphy of the liver.

4560 VALUE OF WHOLE BODY COMPUTERISED AXIAL TOMOGRAPHY IN THE DIAGNOSIS OF LIVER DISEASE [Abstract]. (Eng.) Morris, A. I.; Fawcitt, R. A.; Marsh, M. N.; Isherwood, I. (Hope Hosp., Salford, England). *Gut* 18(5):A417; 1977.

4561 DIAGNOSIS OF EXTRAHEPATIC PORTAL OBSTRUCTION BY GREYSCALE ULTRASOUND [Abstract]. (Eng.) Webb, L. J.; Berger, L. A.; Sherlock, S.

(Royal Free Hosp., Hampstead, London, England). *Gut* 18(5):A417; 1977.

4562 THE EVALUATION OF THE JAUNDICED PATIENT WITH DIAGNOSTIC ULTRASOUND. DIAGNOSTIC FEATURES AND PITFALLS [Abstract]. (Eng.) Weeks, L.; McCune, B. (Bowman Gray Sch. Medicine, Winston-Salem, NC 27103). *Gastroenterology* 72(5, Part 2):1147; 1977.

4563 GALLBLADDER EVALUATION BY DIAGNOSTIC ULTRASOUND. A REVIEW OF CASES DONE IN THE GASTROENTEROLOGY SECTION WITH EMPHASIS ON THE DEVELOPMENT OF CRITERIA FOR DIAGNOSIS AND CRITERIA FOR ADEQUATE EXAM [Abstract]. (Eng.) Weeks, L.; McCune, B. (Bowman Gray Sch. Medicine, Winston-Salem, NC 27103). *Gastroenterology* 72 (5, Part 2): 1146; 1977.

4564 THE CONCENTRATION MAXIMUM CONCEPT IN INTRAVENOUS CHOLANGIOGRAPHY. (Eng.) Behan, M.; Mok, H.; Bell, C. D.; Whitney, B. P. (New York Hosp., 525 East 68th St., New York, NY 10021). *Br. J. Radiol.* 50(596):551-554; 1977.

4565 INTRAVENOUS CHOLANGIOGRAPHY: AN INFUSION REGIMEN DERIVED FROM PLASMA CONCENTRATION MEASUREMENTS. (Eng.) Behan, M. (New York Hosp.-Cornell Medical Center, 525 East 68th St., New York, NY 10021). *Radiol. Clin.* 46(5):340-347; 1977.

4566 ARE RETROGRADE AND TRANSHEPATIC CHOLANGIOGRAPHY CONCURRING PROCEDURES [Abstract]? (Eng.) Merkle, P.; Belohlavek, D.; Feyerabend, G. (Dept. General Surgery, Univ. Ulm, Ulm, W. Germany). *Endoscopy* 9(2):117; 1977.

4567 PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY--IMPROVED METHODS FOR ENHANCING ITS DIAGNOSTIC VALUE ON THE HEPATOBILIARY AND PANCREATIC DISEASES [Abstract]. (Eng.) Tsuchiya, Y.; Ohto, M. (Chiba Univ. Sch. Medicine, Chiba, Japan). *Gastroenterol. Jpn.* 12(1):85; 1977.

4568 DIAGNOSTIC EVALUATION OF ERCP IN BILIARY AND PANCREATIC CANCER [Abstract]. (Eng.) Ogoshi, K.; Niwa, M. (Cancer Center Niigata Hosp., Niigata, Japan). *Gastroenterol. Jpn.* 12(1):85-86; 1977.

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4571 PANCREATOGRAPHY IN PANCREATIC CANCER--VISUALIZATION AND FEATURES OF FINE DUCTS IN THE CANCEROUS LESIONS [Abstract]. (Eng.) Kuroda, A.; Ishikawa, I. (First Dept. Surgery, Univ. Tokyo, Tokyo, Japan). *Gastroenterol. Jpn.* 12(1): 87-88; 1977.

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4573 PRELIMINARY ASSESSMENT OF COMPUTERISED AXIAL TOMOGRAPHY IN PANCREATIC DISEASE [Abstract]. (Eng.) Fawcitt, R. A.; Isherwood, I.; Braganza, J. M.; Howat, H. T. (Dept. Diagnostic Radiology, Univ. Manchester, Manchester, England). *Gut* 18(5):A418; 1977.

4574 GRAY SCALE ULTRASONOGRAPHY AND ENDOSCOPIC RETROGRADE PANCREATOGRAPHY IN THE EVALUATION OF PATIENTS WITH SUSPECTED PANCREATIC DISORDERS [Abstract]. (Eng.) Duberstein, D. L.; Efrusy, M. E. (Chicago Osteopathic Medical Center, Chicago, IL). *Gastroenterology* 72(5, Part 2):1158; 1977.

4575 EVALUATION OF ULTRASONIC SCANNING IN PANCREATIC DISEASE [Abstract]. Russell, J. G. B.; Vallon, A. G.; Braganza, J. M.; Torrance, H. B.; Howat, H. T. (Manchester Royal Infirmary, Manchester, England). *Gut* 18(5):418; 1977.

4576 COMPARISON OF GLUCAGON AND PETHIDINE PLUS ATROPINE AS PREMEDICATION FOR PERORAL ENDOSCOPY: A DOUBLE BLIND STUDY [Abstract]. (Eng.) Melsom, M.; Myren, J.; Larsen, S.; Moe, A. (Ullevaal Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):61; 1977.

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4579 SERUM BILE SALTS AS PREDICTORS OF GALL BLADDER VISUALIZATION [Abstract]. (Eng.)

Craig, R. M. (Veterans Admin. Lakeside Hosp., Chicago, IL). *Clin. Res.* 25(4):570A; 1977.

4580 URINARY UROBILINOGEN--SHOULD WE BE MEASURING IT [Abstract]? (Eng.) Gilmore, I. T.; Peatfield, A. C.; Thompson, R. P. H. (St. Thomas' Hosp., London, England). *Gut* 18(11): A984; 1977.

4581 CARCINOEMBYONIC ANTIGEN IN GASTROINTESTINAL TRACT CARCINOMAS. (Ger.) Auer, I. O. (Medizinische Universitatsklinik, Josef-Schneider-Strasse 2, 8700 Wurzburg, W. Germany). *Dtsch. Med. Wochenschr.* 102(30):1101-1104; 1977.

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4584 A RANDOMIZED DOUBLE-BLIND TRIAL OF TWO DIFFERENT PREMEDICATION REGIMES FOR UPPER INTESTINAL ENDOSCOPY [Abstract]. (Eng.) Schwartz, S. E.; Fazio, T. L. (Upstate Medical Center, Syracuse, NY). *Gastroenterology* 72(5, Part 2):1166; 1977.

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4586 SODIUM PERTECHNETATE Tc 99m SCANNING OF THE ABDOMEN. DIAGNOSIS OF AN ILEAL DUPLICATION CYST. (Eng.) Winter, P. F. (Lahey Clinic Foundation, 605 Commonwealth Ave., Boston, MA 02215). *JAMA* 237(13):1352-1353; 1977.

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4596 CURRENT STATUS OF PANCREATIC FUNCTION TESTS. (Eng.) Lundh, G. (No affiliation given). *Surg. Annu.* 9:133-145; 1977.

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GASTROINTESTINAL DISEASES

ESOPHAGUS

4603 THE EFFICACY OF VASOPRESSIN IN THE TREATMENT OF DIGESTIVE HEMORRHAGES CAUSED BY RUPTURED ESOPHAGEAL VARICES: PRELIMINARY RESULTS OF A RANDOMIZED STUDY. (Fre.) Fourtanier, G.; Tournut, R.; Clanet, J.; Joncquiert, F.; Pascal, J. P. (Hopital de Purpan, 31052 Toulouse Cedex, France). *Therapie* 32(3):283-286; 1977.

The usefulness of vasopressin in the treatment of bleeding esophageal varices was studied in 24 severely cirrhotic patients with bleeding esophageal varices. The patients were randomly divided into 3 groups of 8. All patients were treated with a Linton-Nachlas hemostatic tube. Group 2 additionally received vasopressin intra-arterially (0.4 U/min) and group 3 received vasopressin i.v. Vasopressin did not improve the efficacy of the hemostatic tube and its effect lasted only as long as it was infused. Failures to stop the hemorrhage, recurrences, and deaths were fairly equally distributed among the three groups (2, 3, and 1; 3/6, 1/5, and 3/7; and 5, 5, and 4, resp.). No severe side-effects were associated with the drug at the administered dosage. This preliminary study, therefore, does not show any advantage in the use of vasopressin in addition to a hemostatic tube in the control of esophageal bleeding.

4604 TREATMENT OF ESOPHAGEAL ATRESIA. (Rus.) Prigovich, I. N. (Dept. Pediatric Surgery, Petrozavodsk Univ., Petrozavodsk, USSR). *Vestn. Khir.* 119(8):126-127; 1977.

4605 ESOPHAGEAL BEZOAR: A RARE FACTOR IN THE DIFFERENTIAL DIAGNOSIS OF ESOPHAGEAL CARCINOMA. (Ger.) Rohner, H. G.; Koischwitz, D.; Straaten, G.; Gramann, W. (Medizinische Klinik der Universitat, D-5300 Bonn-Venusberg, W. Germany). *Chirurg* 48(8):545-548; 1977.

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Beneficencia Portuguesa, Sao Paulo, Brazil). *An. Paul. Med. Cir.* 104(2):113-118; 1977.

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4626 ULCER OF OPERATED AND ARTIFICIAL ESOPHAGUS. (Rus.) Kharitonov, L. G. (Central Hosp. No. 1, Moscow, USSR). *Grudn. Khir.* (5):117-122; 1977.

4627 ULCERS OF THE NECK OF HIATAL HERNIA. REPORT OF EIGHT CASES. (Fre.) Viard, H.; Klepping, Cl.; Barault, J. F.; Cayot, M. (Hopital du Bocage, 21000 Dijon, France). *Chirurgie* 103(7): 518-531; 1977.

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4629 SEPTIC COMPLICATIONS IN ESOPHAGEAL SURGERY. (Ger.) Muller, E.; Kremer, K.; Nullen, H. (Chirurgische Universitatsklinik, Moorenstrasse 5, 4000 Dusseldorf, W. Germany). *Therapiewoche* 27(47):8446-8456, *passim;* 1977.

4630 USE OF A TWO-DUCT PROBE IN RECONSTRUCTIVE ESOPHAGEAL SURGERY. (Rus.) Mamontov, A. S.; Kukharenko, V. M. (P. A. Gertsen Scientific Res. Inst. Oncology, Moscow, USSR). *Khirurgiia (Mosk.)* (10):112-114; 1977.

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STOMACH

4631 MORPHOLOGICAL FINDINGS OF DIFFERENT AREAS OF GASTRIC MUCOSA IN PATIENTS WITH ACHLORHYDRIA, EXTREME HYPOCHLORHYDRIA, NORMOCHLORHYDRIA AND THEIR RELATIONSHIP TO SERUM GASTRIN LEVEL: EVIDENCE FOR TWO DIFFERENT TYPES OF GASTRITIS. (Eng.) Massarrat, S.; Schmitz-Moormann, P.; Fritsch, W. P.; Hausamen, T. U.; Kappert, J. (Medizinische Univ.-Poliklinik, Emil Mannkopff-Strasse, D-3550 Marburg, W. Germany). *Klin. Wochenschr.* 55(22):1095-1102; 1977.

The morphological changes of gastric mucosa taken from different areas were studied in patients of approximately the same age with achlorhydria (mean age 60 ± 8 yr), extreme hypochlorhydria (61 ± 9 yr), and normochlorhydria (58 ± 8 yr). The serum gastrin level and parietal cell antibodies were determined in the 41 achlorhydric (peak acid output <1 mEq/hr, pH >5) patients. In these patients the diffuse gastritis was localized in the corpus-fundic area, while the changes in the antral region were few and occurred mostly in the superficial zone. In the 42 normochlorhydric patients, however, the diffuse gastritis was localized in the antral region, with only few changes at the corpus-fundic area. In the 13 patients with extreme hypochlorhydria (1-4 mEq/hr), either the fundic or the antral region was involved. In all but two of the achlorhydric patients, the gastrin level was increased (238 to 1,550 ± 14.5 pg/ml) compared to controls (92 pg/ml). The mean level was higher in patients with intact antral mucosa than in those with superficial or diffuse inflammations. Besides the diffuse gastritis, intestinal metaplasia, pseudopyloric metaplasia, and atrophy of mucosa were also observed, although much less commonly. The increase of gastrin level could not be related to a definite morphological pattern in the gastric mucosa. It can be assumed that each of the two types of gastritis has a different natural history; the antral site of gastritis cannot be transformed into the fundic site, nor can the fundic site be transformed into the antral site.

4632 CARCINOIDS OF THE STOMACH. REPORT OF TWO CASES.

(Eng.) Seifert, E.; Elster, K. (Staedt Krankenhaus, Koblenzer Str. 115, 5400 Koblenz, W. Germany). *Am. J. Gastroenterol.* 68(4): 372-378; 1977.

Endoscopic, histologic, and clinical findings of two patients with disseminated carcinoids restricted to the stomach were studied to determine proper diagnostic procedures for evaluating this type of lesion. A 52-yr-old woman had a pea-sized gastric polyp, multiple small polypoid carcinoids of the Yamada III type, 12 hyperplasiogenic gastric polyps, and an 8-cm broad-based polyp of the Yamada III type. Initially, histological findings suggested gastric carcinoma due to the presence of gland-like structures, found among splintered fragments of the muscularis mucosa, simulating infiltrating growth. Endoscopic polypectomy to remove the large polyp and 2 small lesions, and electrocoagulation using the hot-biopsy technique to remove 10 small lesions were performed. Laboratory studies were within normal limits for all tested parameters. No recurrence was found at 1.5 yr of follow-up. A 54-yr-old man had a flat, 1.2-cm diameter lesion with a broad base and necrotic surface in the upper part of the gastric fundus and a 1.0-cm diameter lesion in the upper body of the greater curvature that appeared similar to the papilla of Vater (elevated with a central depression, no ulceration). However, bridging folds in the surrounding area partially covered the lesion. A polypectomy snare partially removed the fundic lesion, while endoscopic polypectomy totally removed the other. The histologic diagnosis was carcinoid with multicentric foci; further surgery was planned, but the patient died from a cerebrovascular accident. Diagnosis of disseminated carcinoids of the stomach is complicated because the macroscopic appearance of disseminated gastric carcinoids varies, the histological diagnosis is often difficult because the lesions are located in deeper tissue layers, the histological findings can be misinterpreted, and the exact diagnosis requires removing the entire lesion. Polypectomy, button hole-biopsy, or hot-biopsy are useful methods for assessing the pathology as well as the necessity for surgery.

4633 OBSERVATIONS ON BENIGN GASTRIC ULCER SIMULATING GASTRIC CARCINOMA.

(Eng.) Yamagata, S.; Oshiba, S.; Hisamichi, S.; Gomi, T.; Masamune, O.; Mochizuki, F.; *et al.* (Tohoku Univ. Sch. Medicine, Seiryo-cho, 1-1, Sendai, Japan). *Gastroenterol. Jpn.* 12(5):352-356; 1977.

The misdiagnosis of 61 cases that were preoperatively diagnosed as gastric cancer, yet later confirmed in postoperative histological examination as benign gastric ulcer, was analyzed to determine the cause of the errors. Of the 61 cases, 33 were cases of excavated lesions, upon which the investigation focused, and 28 were cases of protruded lesions. Sixteen of 33 were diagnosed pre-operatively as type IIc early cancer; 5 of which were actually gastritis, 10 were benign gastric ulcer or its scar, and 1 was gastric erosion. Ten of 33 cases were diagnosed as type IIc + III or III + IIc early cancer but proved to be benign in postoperative examination. Seven cases diagnosed as Bormann II or III type advanced cancer were actually benign. In 9/33 cases, misdiagnosis was due to the fact that only direct x-ray examination was used; in 15/33 cases both x-ray and endoscopic examinations were used. Even when cytology was added to the procedures, there were still nine cases of misdiagnosis. However, when biopsy was added to the diagnostic procedures, there were only two cases of misdiagnosis. The results indicate that a more accurate diagnosis could be achieved by the use of biopsy.

4634 LIPID-CHEMICAL FEATURES OF HUMAN GASTRIC CANCEROUS, POLYPOUS AND ULCERATIVE TISSUES.

(Eng.) Nakazawa, I.; Asaki, S.; Ito, S. (Tohoku Univ. Sch. Medicine, Sendai 980, Japan). *Tohoku J. Exp. Med.* 123(4):365-370; 1977.

The lipid chemical composition of tissue from 14 patients with gastric cancer, 9 with gastric polyps, and 4 with gastric cancer were analyzed by thin-layer and gas-liquid chromatography to identify the biochemical differences between malignant, benign, and precancerous tissue growth. Normal tissue surrounding the lesions was also studied. The total lipid content was decreased in 71% of gastric cancer and in 75% of gastric ulcer and polyp cases compared to the respective control tissue. The lipid fatty acid content was decreased in five of seven gastric cancer cases and three of four with gastric polyps or ulcer. The phospholipid fatty acid content was decreased in five of six gastric cancer patients and three of six with gastric polyps. All five gastric cancer patients demonstrated decreased triglyceride fatty acid content, while three of five gastric polyp cases had an increased content. There were no significant differences in lipid fatty acid composition between gastric cancerous and benign tissues; however, the average value of $C_{18:2}$ was lower for gastric polyps than for ulcer ($p<0.01$). The average value of phospholipid fatty acid $C_{20:4}$ was increased ($p<0.01$) and $C_{18:2}$ was decreased ($p<0.01$) in gastric patients compared to gastric polyp cases. Triglyceride fatty acid $C_{18:2}$ was significantly decreased ($p<0.01$) in gastric cancer tissues when compared to gastric polyp cases. It is suggested that the changes observed in the cell membrane phospholipid fatty acid composition may produce changes in its fluidity, thus constituting a mechanism for the malignant growth of cancerous tissues.

4635 GASTRIC POLYPS. TRIAL OF CLASSIFICATION OF 83 POLYPS. (Fre.) Lesbros, F.; Labadie, M.; Truchot, R.; Berger, F. (Hopital Edouard Herriot, Place d'Arsonval, 69003 Lyon, France). *Arch. Anat. Cytol. Pathol.* 25(4):251-257; 1977.

Anatomopathological classification of 83 gastric polyps removed from 71 patients by endoscopic resection or gastrectomy is presented. Adenomatous polyps were found in 35 cases, hyperplastic polyps in 35, polyps of antral (Brunner's) glands in 13, and fibroinflammatory polyps in 6. The average of the patients was 62 yr, ranging from 20 to 86 yr. The patients included slightly more women than man, but the difference was not significant. The size of the polyps was 0.3-3 cm, averaging 1 cm. Sixteen patients had two to four polyps, three had more than four. Fifty-six polyps were localized in the antrum, the others in the fundus. Malignant transformation was observed in 5/21 patients with adenomatous polyps. Gastric carcinoma was associated with adenomatous polyps in 12 patients, and with hyperplastic polyps in 3 of 35 patients. Three patients developed recurrent hyperplastic polyps after a latent period of 16-72 months; the first polyp was hyperplastic in one patient, antral gland polyp in another, and unknown in the third. Antral gland polyps and fibroinflammatory polyps are dystrophic or dysgenetic lesions and are not precancerous, while hyperplastic and adenomatous polyps are of a neoplastic nature. Thus, the susceptibility of evolution toward carcinoma occurs in the order hyperplastic polyp, adenomatous polyp, and adenocarcinoma.

4636 PSYCHOLOGICAL DETERMINANTS OF INFANTILE PYLORIC STENOSIS. (Eng.) Revill, S. I.; Dodge, J. A. (Welsh Natl. Sch. Medicine, Heath Park, Cardiff CF4 4XN, Wales). *Arch. Dis. Child.* 53(1): 66-68; 1978.

To investigate the possible contribution of maternal emotional stress to the etiology of infantile pyloric stenosis, 100 mothers of affected infants, 100 "normal" controls who had not sought medical advice at any time concerning feeding problems, and 50 control mothers of children with spina bifida were interviewed. All completed the Life Events Inventory, which gives a quantitative measurement of stressful life events during a given period. In addition, the subject mothers and "normal" controls completed form A of the Eysenck Personality Inventory, the Multiple Affect Adjective Check list, and Linear Analogue Scales for the subjective measurement of satisfaction with feeding and distress caused by feeding problems. A highly significant difference was found between the number of items given a heavy weighting on the Life Events Inventory experienced by the subjects and both control groups ($p<0.02$ with spina bifida controls; $p<0.0001$ with "normal" controls). It is concluded that hypertrophic pyloric stenosis occurs unduly frequently in infants of normal mothers who have been subjected to particularly stressful events during pregnancy.

4637 THE MARKEDLY "CASCADE" STOMACH [Abstract]. (Eng.) Deitel, M. (St. Joseph's Hosp., Toronto, Canada). *Gastroenterology* 72(5, Part 2): 1156; 1977.

4638 GLANDULAR CYSTS OF GASTRIC MUCOSA, A NEW GASTROENTEROLOGICAL ENTITY [Abstract]. (Eng.) Gohrband, G.; Krentz, K. (Luisenhosp., Aachen, W. Germany). *Endoscopy* 9(2):115; 1977.

4639 ACUTE GASTRIC DILATATION IN ANOREXIA NERVOSA. (Eng.) Brook, G. K. (Airedale General Hosp., Steeton, Keighley, W. Yorkshire, England). *Br. Med. J.* 2(6085):499-500; 1977.

4640 UNUSUAL CAUSES OF GASTROCOLIC FISTULA. (Eng.) Laufer, I.; Joffe, N.; Stolberg, H. (Hosp. Univ. Pennsylvania, 3400 Spruce St., Philadelphia, PA 19104). *Gastrointest. Radiol.* 2(1):21-25; 1977.

4641 CORROSIVE GASTRITIS. (Eng.) Ragheb, M. I.; Ramadan, A. A.; Khalil, M. A. (Univ. Alexandria Faculty Medicine, Alexandria, Egypt). *Am. J. Surg.* 134(3):343-345; 1977.

4642 DRUG INDUCED ACUTE EROSIVE GASTRITIS: ITS PREVENTION BY ANTACID, METIAMIDE AND CIMETIDINE. (Eng.) Mann, N. S. (Veterans Admin. Hosp., Louisville, KY). *Am. J. Proctol.* 28(2): 23-28; 1977.

4643 IDIOPATHIC CHRONIC GASTRITIS. (Eng.) Chatterjee, D. (Univ. Hosp. West Indies, Mona, Kingston, Jamaica). *Surg. Gynecol. Obstet.* 143(6):986-1000; 1976.

4644 VALUE AND LIMITS OF ENDOSCOPIC GASTRIC MUCOSAL BIOPSIES IN THE DIAGNOSIS OF CHRONIC ATROPHIC GASTRITIS [Abstract]. (Eng.) Naccarato, R.; Farini, R.; Salvagnini, M.; Di Mario, F.; Sturniolo, G. C.; Chiaramonte, M.; Mazzucato, B. (Policlinico Universitario, Padova, Italy). *Rend. Gastroenterol.* 9(1):75; 1977.

4645 POSTOPERATIVE MEDICAL PROBLEMS OF THE STOMACH. (Ger.) Miederer, S. E. (Medizinische Poliklinik der Universitat, Wilhelmstrasse 35, 53 Bonn, W. Germany). *Roentgenblaetter* 30(7): 347-351; 1977.

4646 INCIDENCE AND DIAGNOSIS OF GASTRIC CANCER IN OUT-PATIENT CONDITIONS. (Rus.) Zhivetsky, A. V.; Andrusenko, V. A.; Bodnar, G. V.; Balan, I. V. (Chernovitsy Medical Inst., Chernovitsy, USSR). *Vestn. Khir.* (5):10-13; 1977.

4647 DYNAMICS OF CHANGE OF THE FUNCTIONAL STATE OF THE LIVER BEFORE AND AFTER GASTRECTOMY PERFORMED BY VARIOUS METHODS IN PATIENTS WITH GASTRIC CANCER. (Rus.) Gubergrits, A. Ya.; Sycheva, V. V.; Makarov, V. L. (A. M. Gorky Donetsk Medical Inst., Donetsk, USSR). *Klin. Khir.* (5): 13-18; 1977.

4648 STATISTICAL MORBIDITY OF MALIGNANT GASTRIC TUMORS IN ESTONIA DURING 1963-1972. (Rus.) Rakhu, M. A. (Inst. Experimental and Clinical Medicine, Estonian SSR Ministry Health, Tallin, USSR). *Vopr. Onkol.* 23(5):41-45; 1977.

4649 BLOOD SEROTONIN IN PATIENTS WITH GASTRIC CANCER. (Rus.) Agaev, B. A.; Guliev, B. G. (Azerbaijan State Medical Inst., Baku, USSR). *Vopr. Onkol.* 23(5):50-54; 1977.

4650 EFFECTS OF A COFFEE-ANTACID-MIXTURE AND A COMMERCIAL COFFEE WITH REGARD TO GASTRIN, pH, AND GASTRIC SECRETION. (Ger.) Schusdziarra, V.; Matthiessen, A.; Heisig, N. (Universitatskrankenhauses Hamburg-Eppendorf, W. Germany). *Z. Gastroenterol.* 15(7):448-456; 1977.

4651 FAILURE OF SUTURES FOLLOWING GASTRIC RESECTION FOR GASTRODUODENAL ULCERS. (Rus.) Ladnyuk, B. P.; Goltsov, A. P.; Zabrosaev, V. S.; Sokolov, A. S. (Smolensk Medical Inst., Smolensk, USSR). *Khirurgiia (Mosk.)* (8):9-12; 1977.

4652 POSTGASTRECTOMY ACUTE AFFERENT LOOP SYNDROME: REPORT OF FOUR CASES. (Fre.) Pouyet, M.; Treboux, M.; Perrin, J. P.; Lescoeur, N. (Clinique Claude-Bernard, 69600 Oullins, France). *Lyon Chir.* 73(2):141-145; 1977.

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4654 ENDOSCOPIC TREATMENT OF PHYTOBEZOARS. (Fre.) Oselladore, D.; Norberto, L.; De Marchi, M. (Inst. Surgical Pathology, Univ. Padua, Padua, Italy). *J. Chir. (Paris)* 113(5/6): 527-530; 1977.

4655 TERATOMAS IN CHILDHOOD: EXPERIENCES IN 50 CASES DURING A 25-YEAR PERIOD: PRESENTATION OF A TERATOMA OF THE STOMACH. (Ger.) Zimmermann, F. A.; Stemp, A. F.; Meister, P. (Univ.-Kinderklinik Munchen, Lindwurmstrasse 4, 8000 Munchen 2, W. Germany). *Z. Kinderchir.* 21 (3):203-213; 1977.

4656 EARLY ENTERAL FEEDING AFTER GASTRIC AND DUODENAL SURGERY. (Rus.) Nechai, A. I.; Abolimov, E. V. (C. M. Kirov Military-Medical Acad., Leningrad, USSR). *Vestn. Khir.* (6):51-55; 1977.

4657 ASSESSMENT OF THE THYROTROPIC FUNCTION OF THE HYPOPHYSIS AND HORMONAL ACTIVITY OF THE THYROID IN PATIENTS WITH GASTRIC CANCER. (Rus.) Afrikyan, M. N.; Menshikov, V. V. (Center Oncology Science, Acad. Medical Sciences USSR, Moscow, USSR). *Sov. Med.* (6):48-51; 1977.

4658 PROBLEMS OF SURGICAL TREATMENT OF GASTRIC POLYPS. (Rus.) Berezov, Yu. E.; Anakhasyan, V. R.; Druker, I. P.; Erokhin, P. G.; Kovalev, A. I.; Kukushkin, V. N.; *et al.* (N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (6):36-40; 1977.

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4660 THE COURSE OF BLEEDING ANASTOMOTIC ULCER: REPORT OF 28 CASES. (Fre.) Bodin, F.; Dyan, S.; Fraitag, B.; Delage, Y.; Lichtenstein, H. (Hopital Saint-Antoine, 184, rue du Faubourg-Saint-Antoine, F 75012 Paris, France). *Gastroenterol. Clin. Biol.* 1(6/7):515-518; 1977.

4661 GASTRIC HEMANGIOPERICYTOMA. (Ger.) Berner, H.; Streicher, H. J. (Chirurgische Klinik, Ferdinand-Sauerbruch-Klinikum, D-5600 Wuppertal 1, W. Germany). *Chirurg* 48(6):400-402; 1977.

4662 MURAMIDASE ACTIVITY IN GASTRIC JUICE AND SERUM IN PATIENTS WITH GASTRIC CARCINOMA. (Pol.) Hanczyc, H.; Luboczynska-Kowalska, W.; Cader, J. (Acad. Medicine, ul. Poniatowskiego 2, 50-326 Wroclaw, Poland). *Pol. Tyg. Lek.* 32(32): 1241-1243; 1977.

4663 SURGICAL APPROACH IN PREPYLORIC STENOSIS DUE TO CORROSIVE SUBSTANCES: INTRAVASCULAR SEGMENTAL ANTRECTOMY IN Y-V. REPORT OF 80 CASES. (Fre.) Popovici, Z. (15, rue Judetului, Bloc 17, Scara II, Ap. 41, Bucharest, Rumania). *J. Chir. (Paris)* 113(2):181-190; 1977.

4664 RESULTS OF TRUNCAL VAGOTOMY FOR THE TREATMENT OF GASTRODUODENAL ULCER: REPORT OF 113 CASES. (Fre.) Grandjean, J. P.; Tissot, E.; MacMoune, F.; Minaire, Y.; Baudet, B.; Moulay, A.; *et al.* (Hopital Edouard Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 73(3): 192-199; 1977.

See also, 4358, 4360, 4365, 4372, 4373, 4374, 4376, 4379, 4385, 4390, 4396, 4397, 4398, 4400, 4431, 4530, 4541, 4553, 4554, 4556, 4582, 4583, 4593, 4597, 4616, 4619, 4620, 4622, 4650, 4665, 4666, 4676, 4677, 4687, 4695, 4697, 4701, 4702, 4703, 4947, 4950, 4978, 4984, 4985, 5000, 5006, 5012, 5017, 5043, 5045.

STOMACH

Peptic Ulcers

4665 ACID, PEPSIN AND SODIUM OUTPUTS DURING THE INTRAVENOUS PENTAGASTRIN TEST: VARIATIONS ACCORDING TO AGE AND WEIGHT IN MAN. ANALYSIS OF 400 TESTS. (Fre.) Ligny, G.; Verelst, R. (Hopital civil de Charleroi, Boulevard Jason, B-6000 Carleroi, Belgium). *Acta Gastroenterol. Belg.* 40(5/6):205-221; 1977.

Variations in gastric acid and pepsin secretion and in Na output, according to age and weight, were analyzed during the i.v. pentagastrin perfusion test (6 μg/kg/hr) in 177 healthy controls, 107 duodenal ulcer patients, and 116 gastritis patients. Gastric secretion was collected at 15-min intervals. The Na output did not vary significantly between the three groups, nor did it change with age or weight. In duodenal ulcer patients, the acid and pepsin outputs were significantly increased over controls ($p<0.01$) only in patients in the 25- to 35-yr age bracket. The patients with gastritis had significantly decreased acid and pepsin outputs and an increased ratio of pepsin output/acid output ($p<0.01$). An acid output <25.7 mEq/hr was diagnostic of hypoacidity. The acid output did not rise significantly with weight in the patients, nor did it decrease significantly with age in the controls. The overlap of values of acid and pepsin outputs between controls and duodenal ulcer patients, even when adjusted for age and weight, prevents these parameters from being of any use in the diagnostic value of the pentagastrin test.

4666 IMMUNOHISTOCHEMICAL INVESTIGATION OF GASTRIN-PRODUCING CELLS (G CELLS): ESTIMATION OF ANTRAL DENSITY, MUCOSAL DISTRIBUTION, AND TOTAL MASS OF G CELLS IN RESECTED STOMACHS FROM PATIENTS WITH PEPTIC ULCER DISEASE. (Eng.) Stave, R.; Brandtzaeg, P. (Univ. Hosp., Rikshospitalet, Oslo, Norway). *Scand. J. Gastroenterol.* 13(2):199-203; 1978.

In an effort to correlate several characteristics of the gastrin-producing (G) cells with clinical variables, the mucosal distribution of G cells was quantitatively mapped in resected stomachs from 42 patients (12 with gastric ulcer, 11 with duodenal ulcer, 14 with duodenal ulcer and uremia, and 5 with gastric cancer). Immunoreactive G cells were not seen in the body of the stomach of any of the patients, and only low numbers occurred in the transitional zone along the proximal border of the pyloric antrum. The proximal end of the duodenum contained considerably fewer G cells than did the antrum, and the numbers were equal in all patient groups. Within the antrum, there was, in the material as a whole, a gradual increase in G cell density from the proximal to the distal part, but this difference was not seen in the gastric ulcer patients. The differences between the distal and proximal antrum and between the middle and proximal antrum were significant ($p \leq 0.05$). In the patients with duodenal ulcer and uremia there was also a significant difference ($p \leq 0.05$) between the middle and distal segments. When the various patient categories were compared, there was no significant difference in the overall antral G cell density, the antral surface area corresponding to the G cell distribution, and the total antral G cell mass. However, the G cell density in the distal antrum was significantly lower ($p \leq 0.05$) in patients with gastric ulcer than in the other groups. The variations in these parameters were not significantly related to diagnosis, age, or sex, and a significant positive correlation between body weight and G cell mass was found only in the group with duodenal ulcer and uremia ($r=0.539$, $p \leq 0.05$). This variability should be kept in mind when biopsy is used to study the endocrine function of the stomach.

4667 THE INCIDENCE OF UROLITHIASIS IN PEPTIC ULCER PATIENTS. (Eng.) Golematis, B.; Melissas, J.; Hatzitheofilou, C.; Dreiling, D. A.;

Kambysi-Dea, S. (40 Solonos St., Athens 153, Greece). *Am. J. Gastroenterol.* 68(4):367-371; 1977.

The incidence of urinary lithiasis was determined in 200 patients with peptic ulcer and in 200 healthy controls. In 7% of ulcer patients, urinary calculi were found, whereas only 1% ($p<0.01$) was found in the controls. The increased incidence of peptic ulcer was attributed to the consumption of calcium in combination with easily absorbable alkalis (sodium bicarbonate). These findings must be considered in therapy for peptic ulcer diathesis.

4668 CIMETIDINE VERSUS INTENSIVE ANTACID THERAPY FOR DUODENAL ULCER: A MULTICENTER TRIAL.

(Eng.) Ippoliti, A. F.; Sturdevant, R. A. L.; Isenberg, J. I.; Binder, M.; Camacho, R.; Cooney, C.; *et al.* (Wadsworth Veterans Hosp., Wilshire and Sawtelle Blvd., Los Angeles, CA 90073). *Gastroenterology* 74(2):393-395; 1978.

Ulcer healing and pain relief was studied in 94 patients with duodenal ulcer who were treated with cimetidine or an intensive antacid regimen to compare the two treatments. In a randomized double blind multicenter trial, patients treated with cimetidine (800 or 1,200 mg daily) or an intensive regimen of Al-Mg antacid (210 ml/day) had similar rates of duodenal ulcer healing and pain relief. After 4 weeks of treatment, the proportion of patients with ulcer healing by endoscopy were: 1,200 mg cimetidine, 21 of 33; 800 mg cimetidine, 19 of 32; and antacids, 15 of 29. These proportions did not differ significantly. Eighty percent of cimetidine-treated patients became asymptomatic by week 4, as did 63% of antacid-treated patients ($p>0.1$). No untoward effects were observed during cimetidine treatment. Twenty-seven percent of antacid-treated patients reported diarrhea. There were no significant differences between the two treatments.

4669 CIMETIDINE IN THE TREATMENT OF DUODENAL ULCER: A MULTICENTER DOUBLE BLIND STUDY.

(Eng.) Binder, H. J.; Cocco, A.; Crossley, R. J.; Finkelstein, W.; Font, R.; Friedman, G.; *et al.* (Yale Univ., New Haven, CT). *Gastroenterology* 74(2, Part 2):380-388; 1978.

The effect of cimetidine in duodenal ulcer disease was assessed in a double-blind, controlled, prospective, multicenter clinical trial in both inpatients and outpatients. Endoscopic evidence of ulcer healing and symptom evaluation were monitored in 308 patients who received either 1.2 g of cimetidine daily or placebo for periods varying from 2 to 6 weeks. Both groups of patients received antacids only for symptom relief. At the end of 2 weeks of inpatient therapy, 56% of the cimetidine-treated patients and 37% of the patients treated with placebo ($p<0.05$) showed evidence of ulcer healing. Similarly, 46% and 26% of the outpatients treated with cimetidine or placebo, resp., for 2 weeks had ulcer healing ($p<0.05$). At all other time intervals, ulcer healing occurred more frequently in the cimetidine patients than in the controls, but these differences did not achieve statistical significance. Evaluation of symptom relief (day pain, night pain, and severity of pain), "global efficacy," and antacid consumption rates supported the efficacy of cimetidine compared with placebo. Those patients treated with cimetidine who had lower rates of gastric acid secretion (peak acid output <36.3 mEq/hr) after 1 week of therapy had an increased incidence of ulcer healing (53%), in comparison with that in patients with a higher peak acid output (14%, $p<0.05$). In both the cimetidine- and placebo-treated groups, there was little correlation between ulcer healing and symptom improvement. The results demonstrate an acceleration of duodenal ulcer healing and an increased symptom response with cimetidine therapy.

4670 CIMETIDINE TREATMENT OF DUODENAL ULCERATION: SHORT TERM CLINICAL TRIAL AND MAINTENANCE STUDY.

(Eng.) Hetzel, D. J.; Hansky, J.; Shearman, D. J. C.; Korman, M. G.; Hecker, R.; Taggart, G. J.; *et al.* (Royal Adelaide Hosp., Adelaide, South Australia 5001, Australia). *Gastroenterology* 74(2, Part 2):389-392; 1978.

Eighty-five patients with endoscopically confirmed duodenal or pyloric canal ulcers entered a double-blind trial with cimetidine (1,200 mg/day, p.o.) or placebo for 6 weeks. Ulcer healing occurred in 84% of patients treated with cimetidine and 38% of those receiving placebo ($p<0.001$). Measurement of basal acid output and maximal acid output before and after treatment showed no significant change, but patients whose ulcers did not heal had a higher basal acid output and maximal acid output than those whose ulcers healed ($p<0.001$ and $p=0.07$, resp.). Patients who smoked or drank alcohol had the same healing rate as abstainers. Sixty-seven patients with duodenal ulceration healed by a 6-week course of cimetidine were randomly allocated to 400 mg of cimetidine twice daily or placebo in the maintenance trial. By the 80th day of therapy, approximately 45% of those receiving placebo had relapsed, whereas none of those receiving cimetidine had relapsed ($p<0.001$). Actuarial analysis of the number of relapses in each group demonstrates that cimetidine is highly effective in preventing relapse.

4671 EFFECT OF ONE-MONTH TREATMENT WITH CIMETIDINE ON GASTRIC SECRETION AND SERUM GASTRIN AND PEPSINOGEN LEVELS.

(Eng.) Sewing, K. F.; Hagie, L.; Ippoliti, A. F.; Isenberg, J. I.; Samloff, I. M.; Sturdevant, R. A. L. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA 90073). *Gastroenterology* 74(2, Part 2):376-379; 1978.

The inhibitory effects of cimetidine on gastric acid and pepsin secretion were studied before and after 1 month of treatment with cimetidine (300 mg, q.i.d.) in 15 male duodenal ulcer patients. Peptone meal- and pentagastrin-stimulated acid secretion and meal-stimulated gastrin release were measured before and 30 min after a single p.o. dose of cimetidine (300 mg). Cimetidine inhibited both pentagastrin- and peptone meal-stimulated acid secretion significantly better before, than after, 1 month of treatment ($p<0.05$). Similarly, cimetidine inhibited pentagastrin-stimulated pepsin secretion significantly better before treatment ($p<0.01$). Meal-stimulated serum gastrin concentrations were significantly higher after treatment. The mechanisms(s) of these effects is not apparent.

4672 MAINTENANCE TREATMENT OF RECURRENT PEPTIC ULCER BY CIMETIDINE.

(Eng.) Bodemar, G.; Walan, A. (Univ. Hosp., 581 85 Linkoping, Sweden). *Lancet* 1(8061):403-407; 1978.

In a double-blind trial of 68 patients with chronic peptic ulcer, 32 received cimetidine (400 mg b.i.d.) and 36 received a placebo for 1 yr. Six of those on cimetidine had an endoscopically proven recurrent ulcer within a mean period of 7 months, while 30 of those on placebo had one after a mean period of 4 months ($p<0.0005$). One patient on cimetidine, compared with 12 patients on placebo, had two recurrences ($p<0.0005$). No patient in the cimetidine group had complications compared to four patients in the placebo group, two of whom had melena and hematemesis and two melena alone ($p<0.05$). Fifteen patients on placebo and one on cimetidine were referred for surgery during the trial because of symptoms from their recurrent ulcers. Day and night ulcer pain and antacid consumption were significantly less ($p<0.001$) and general well-being was better in the cimetidine group. The only probable side-effect of cimetidine was reversible drug-induced liver damage of hypersensitivity type in one patient.

4673 EFFECT OF CIMETIDINE ON PENTAGASTRIN-STIMULATED GASTRIC ACID AND PEPSIN SECRETION BEFORE AND AFTER 6 WEEKS OF CIMETIDINE TREATMENT.

(Eng.) Aadland, E.; Berstad, A. (Aker Hosp., Oslo 5, Norway). *Scand. J. Gastroenterol.* 13(2):193-197; 1978.

The effect of i.v. cimetidine on pentagastrin-stimulated gastric acid and pepsin secretion was studied before and after 6 weeks of p.o. cimetidine treatment (1 g/day) in 10 duodenal ulcer patients, to determine whether the effect of this drug changes during the treatment period. The second secretion test was performed 60 hr after the last dose of p.o. cimetidine. Pentagastrin (1.5 µg/kg/hr) was infused for 165 min, and cimetidine (1.2 mg/kg/hr) was added by concomitant infusion during the last 90 min. Mean acid and pepsin secretion in response to pentagastrin stimulation were not significantly changed after 6 weeks of p.o. cimetidine treatment, with gastric acid and pepsin values being 35.1 ± 23.8 mmol/hr and 164.8 ± 67.3 mg/hr, resp., before treatment and 34.8 ± 20.1 mmol/hr and 234.5 ± 185.1 mg/hr, resp., after treatment. However, the response to pentagastrin plus cimetidine administration was significantly higher at the end of the treatment period (gastric acid and pepsin values were 5.7 ± 3.8 mmol/hr and 29.8 ± 17.5 mg/hr, resp., before treatment and 9.9 ± 5.7 mmol/hr and 90.0 ± 77.6 mg/hr, resp., after treatment, $p<0.05$ and $p<0.02$, resp.). Moreover, before the treatment period with cimetidine, pepsin output during pentagastrin plus cimetidine was, on average, 20.5% of the response to pentagastrin alone, while after treatment this value increased to 38.9% ($p<0.05$). The results suggest a slightly reduced effect of cimetidine after its prolonged use. However, cimetidine was still effective after having cured the ulcers in 6 weeks of treatment; in one patient there was no further significant reduction of the effect of cimetidine infusion between 6 and 10 weeks of cimetidine treatment.

4674 ESTIMATION OF THE ANTRAL AND DUODENAL GASTRIN CELL POPULATION REMOVED BY GASTRECTOMY FROM PATIENTS WITH PEPTIC ULCER.

(Eng.) Keuppens, F.; Willems, G.; Vansteenkiste, Y.; Woussen-Colle, M. C. (Gastrointestinal Res. Unit, Vrije Universiteit Brussels, Brussels, Belgium). *Surg. Gynecol. Obstet.* 146(3):400-406; 1978.

The total number of gastric and duodenal gastrin cells was determined in the gastrectomy specimens from eight patients with peptic ulcer, using a modified method. Planimetry was used to determine the antral and duodenal surface. The immunoperoxidase method with specific antigastrin antibodies was used for staining gastrin cells, and the mean concentration of nucleated gastrin cells/mm^2 of antral and duodenal surface was determined by light microscopy. The mean number of duodenal gastrin cells in the resected duodenum was 4.8% of the total gastric gastrin cell mass. The concentration of gastrin cells was greatest in the antrum and quite variable from one mucosal site to another. The degree of extension of the antral gastritic areas was a major factor influencing the mean concentration value. The total number of gastrin cells in the stomach varied from approximately 7 to 74 million cells. These data indicate that hyperplasia of gastrin cells cannot be demonstrated by studies performed in small specimens taken for biopsy.

4675 JEJUNAL INHIBITION OF GASTRIC ACID SECRETION INDUCED BY HYPERTONIC GLUCOSE IN DUODENAL ULCER PATIENTS BEFORE AND AFTER TRUNCAL VAGOTOMY.

(Eng.) Christiansen, J.; Aagaard, P.; Hansen, T. (Glostrup Hosp., DK-2600 Glostrup, Copenhagen, Denmark). *Ann. Surg.* 187(2):122-125; 1978.

The possible vagal control of the inhibition of gastric acid secretion induced by intrajejunally administered hypertonic glucose was studied in eight duodenal ulcer patients. Hypertonic glucose was infused after the induction of acid secretion by pentagastrin (0.5 µg/kg/hr) in the patients before and 3 to 5 months after truncal vagotomy. Preoperatively, mean acid output was reduced from 44.0 ± 3.1 mEq H^+/hr to 29.2 ± 2.9 mEq H^+/hr ($p<0.05$), whereas no consistent changes were found postoperatively, suggesting that jejunal inhibition of gastric acid secretion induced by hypertonic glucose primarily is under vagal control. Furthermore, the study shows that glucose-induced jejunal inhibition of acid secretion seems to be less pronounced in duodenal ulcer patients than was previously found in healthy subjects.

4676 EFFECT OF SELECTIVE GASTRIC VAGOTOMY ON HISTAMINE CONCENTRATION IN GASTRIC MUCOSA OF PATIENTS WITH DUODENAL ULCER. (Eng.) Troidl, H.; Rohde, H.; Lorenz, W.; Hafner, G.; Hamelmann, H. (Univ. Surgical Clinic, Robert-Koch-Strasse 8, 3550 Marburg/Lahn, W. Germany). *Br. J. Surg.* 65(1):10-16; 1978.

In a prospective controlled trial, histamine concentrations were determined fluorometrically in the gastric mucosa of 23 patients 6-11 months after selective gastric vagotomy with drainage and in patients who had undergone other types of operation for duodenal ulcer. The study was in two parts: part 1, a synchronous investigation of mucosal histamine concentrations in patients who had undergone vagotomy, in duodenal ulcer patients before operation, and in control subjects; part 2, a consecutive study of the same patients before and after vagotomy. In part 1, patients with Hollander-negative vagotomy were found to have significantly ($p<0.01$) higher mucosal histamine concentrations than did healthy control subjects or duodenal ulcer patients before operation. Patients with recurrent ulcer, however, had mucosal histamine concentrations as low as those of duodenal ulcer patients who had not been operated on. In part 2, all duodenal ulcer patients showed an increase in gastric mucosal histamine concentration after vagotomy ($p<0.01$). The smallest increase was in a patient with an incomplete vagotomy. Control patients who were not operated on but who underwent endoscopy and biopsy twice in the period of investigation, did not show any increase in mucosal histamine concentration between the times of the first and the second biopsy. The overall results of selective vagotomy and drainage, with respect both to clinical Visick gradings and to radiological and acid secretory findings, were comparable to those reported by other authors. No significant change in numbers of parietal cells was found after vagotomy. Thus, selective gastric vagotomy with a drainage procedure leads to increased concentrations of histamine in the mucosa of the body of the stomach in man. The mechanism is not clear, but might be through inhibition of histamine release from mast cell stores.

4677 SHOULD CHOLECYSTECTOMY BE COMBINED WITH VAGOTOMY AND PYLOROPLASTY? (Eng.) Taylor, T. V.; Qureshi, S.; Lambert, M. E.; Torrance, B. (Royal Infirmary, Edinburgh EH3 9YW, Scotland). *Lancet* 1(8059):295-298; 1978.

Sixty patients who had undergone vagotomy, pyloroplasty, and cholecystectomy were compared with age- and sex-matched controls who had undergone vagotomy and pyloroplasty alone or cholecystectomy alone. In the early postoperative period after the combined procedure, there was a very high incidence of postvagotomy diarrhea (48.3%, $p=0.00013$) and bile reflux gastritis. The findings implicate bile acids--their excretion and handling by the small intestine--in the etiology of postvagotomy diarrhea. Where the conditions coexist, truncal vagotomy and pyloroplasty should be avoided in the treatment of the duodenal ulcer because of the risk of postvagotomy diarrhea and bile reflux gastritis.

4678 ADENYLATE CYCLASE ACTIVITY IN GASTRIC MUCOSAL BIOPSY SPECIMENS OF NORMALS [sic] AND DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Sewing, K. F.; Ruoff, H. J.; Malchow, H. (Dept. Pharmacology, Univ. Tubingen, 7400 Tubingen, W. Germany). *Gastroenterology* 72(5, Part 2):1130; 1977.

4679 LUMINAL GASTRIN AND GASTRIN RELEASE [Letter to Editor]. (Eng.) Quinn, T. J.; Fiddian-Green, R. G. (Univ. Hosp., Ann Arbor, MI 48104). *Lancet* 2(8032):307-308; 1977.

4680 STIMULATION OF GASTRIN RELEASE AND GASTRIC ACID SECRETION BY A STANDARDIZED PEPTONE TEST MEAL IN NORMAL SUBJECTS AND DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Fritsch, W. P.; Gehrsmann, U.; Hausamen, T. U. (I Medizinische Universitatsklinik A., Dusseldorf, W. Germany). *Rend. Gastroenterol.* 9(1):69-70; 1977.

4681 THE GENETICS OF PEPTIC ULCER DISEASE--ELEVATED SERUM GROUP I PEPSINOGEN CONCENTRATIONS IN SIBLINGS AND TWINS OF ULCER PROBANDS [Abstract]. (Eng.) Rotter, J. I.; Rimoin, D. L.; Samloff, I. M.; McConnell, R. B.; Jensen, K. G.; Gadeberg, O.; Hauge, M. (Harbor General Hosp., Torrance, CA). *Gastroenterology* 72(5, Part 2):1165; 1977.

4682 GASTRIC EMPTYING AND PLASMA SECRETIN LEVELS AFTER ORAL ADMINISTRATION OF HYDROCHLORIC ACID IN NORMAL AND DUODENAL ULCER SUBJECTS [Abstract]. (Eng.) McLoughlin, J. C.; Green, R.; Buchanan, K. D. (Dept. Medicine, Queen's Univ., Belfast, Northern Ireland). *Gut* 18(5):A406; 1977.

4683 PLASMA SECRETIN IN FASTING AND POSTPRANDIAL STATE IN MAN [Abstract]. (Eng.) Chey, W. Y.; Hendricks, J.; Tai, H. H. (Genesee Hosp., Rochester, NY). *Gastroenterology* 72(5, Part 2):1156; 1977.

4684 PEPTIC ULCER, PYLOROPLASTY, AND DIETARY FAT. A NEW CONCEPT. (Eng.) Childs, P. (Plymouth General Hosp., Plymouth, England). *Ann. R. Coll. Surg. Engl.* 59(2):143-147; 1977.

4685 PREVENTION OF RELAPSE OF DUODENAL ULCER BY BEDTIME CIMETIDINE: A DOUBLE-BLIND CLINICAL TRIAL [Abstract]. (Eng.) Blackwood, W. S.; Maudgal, D. P.; Northfield, T. C. (St. George's

Hosp. Medical Sch., London, England). *Gut* 18(5): A420; 1977.

4686 CIMETIDINE OR INTENSIVE ANTACID THERAPY FOR DUODENAL ULCER--A CONTROLLED MULTI-CENTER TRIAL [Abstract]. (Eng.) Ippoliti, A. F. (Center Ulcer Res. and Education [CURE], Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1161; 1977.

4687 CIMETIDINE AND ACTIVE DUODENAL AND PRE-PYLORIC ULCERS. (Eng.) Bodemar, G.; Walan, A. (Univ. Hosp., Linkoping, Sweden). *Scand. J. Gastroenterol.* 11(Suppl. 42):155-158; 1976.

4688 MAINTENANCE CIMETIDINE IN THE CONTROL OF DUODENAL ULCER SYMPTOMS [Abstract]. (Eng.) Gray, G. R.; Smith, I. S.; Gillespie, G.; Mackenzie, I. (Victoria Infirmary, Glasgow, Scotland). *Gut* 18 (5):A420; 1977.

4689 EFFECT OF CIMETIDINE ON PENTAGASTRIN- AND MEAL-STIMULATED GASTRIC ACID SECRETION AND SERUM GASTRIN BEFORE AND AFTER ONE MONTH OF DAILY CIMETIDINE TREATMENT [Abstract]. (Eng.) Sewing, K. F.; Hagie, L.; Ippoliti, A. F.; Isenberg, J. I.; Samloff, I. M.; Sturdevant, R. A. (Veterans Admin. Wadsworth Hosp. Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1129; 1977.

4690 EFFECT OF ONE YEAR'S TREATMENT WITH CIMETIDINE ON PARIETAL CELL MASS IN DUODENAL ULCER PATIENTS [Abstract]. (Eng.) Spence, R. W.; Celestin, L. R.; McCormick, D. A. (Frenchay Hosp., Bristol, England). *Gut* 18(5):A420-A421; 1977.

4691 AGRANULOCYTOSIS FOUR MONTHS AFTER CIMETIDINE THERAPY [Letter to Editor]. (Eng.) Craven, E. R.; Whittington, J. M. (Kettering and District General Hosp., Kettering, Northamtonshire NN16 8UZ, England). *Lancet* 2(8032):294-295; 1977.

4692 A DOUBLE-BLIND TRIAL OF THE SYMPTOMATIC EFFECT OF PRINDAMINE IN DUODENAL ULCER PATIENTS. (Eng.) Wulff, H. R.; Soltoft, J.; Gudmand-Hoyer, E.; Mollmann, K. M.; Bonnevie, O.; Hopfner Petersen, H. E.; Overo, K. F. (Gentofte Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 11(Suppl. 42):129-131; 1976.

4693 5,6,7,8-TETRAHYDROQUINOLINES. 4. ANTIULCER AND ANTISECRETORY ACTIVITY OF 5,6,7,8-TETRAHYDROQUINOLINENITRILES AND -THIOAMIDES. (Eng.) Beattie, D. E.; Crossley, R.; Curran, A. C. W.; Dixon, G. T.; Hill, D. G.; Lawrence, A. E.; Shepherd, R. G. (Inst. Medical Res., Wyeth Lab., Huntercombe Lane South, Taplow, Maidenhead, Berkshire SL6 OPH, England). *J. Med. Chem.* 20(5):714-718; 1977.

4694 5,6,7,8-TETRAHYDROQUINOLINES. 5. ANTIULCER AND ANTISECRETORY ACTIVITY OF 5,6,7,8-TETRAHYDROQUINOLINETHIOUREAS AND RELATED HETEROCYCLES. (Eng.) Beattie, D. E.; Crossley, R.; Curran, A. C. W.; Hill, D. G.; Lawrence, A. E. (Inst. Medical Res., Wyeth Lab., Huntercombe Lane South, Taplow, Maidenhead, Berkshire SL6 OPH, England). *J. Med. Chem.* 20(5):718-721; 1977.

4695 RELATIONSHIPS OF GASTRIN TO DUODENAL ULCER DISEASE IN MAN AND THE EFFECTS OF SURGERY. (Eng.) Herbst, C. A., Jr. (Univ. North Carolina Sch. Medicine, 136 Clinical Sciences Bldg., 229H, Chapel Hill, NC 27514). *Am. J. Surg.* 133(5): 619-627; 1977.

4696 EFFECT OF PROXIMAL GASTRIC VAGOTOMY ON GASTRIC SECRETION. (Eng.) Roland, M. (Aker Univ. Hosp., Oslo, Norway). *Scand. J. Gastroenterol.* 11(Suppl. 42):89-91; 1976.

4697 INFLUENCE OF DIFFERENT TECHNIQUES OF PROXIMAL GASTRIC VAGOTOMY UPON RISK OF RECURRENT DUODENAL ULCER AND GASTRIC ACID SECRETION. (Eng.) Kronborg, O.; Jorgensen, P. M.; Holst-Christensen, J. (Bispebjerg Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 143(1):53-56; 1977.

See also, 4378, 4379, 4382, 4393, 4538, 4583, 4597, 4619, 4650, 4651, 4659, 4664, 4702, 5000.

SMALL INTESTINE

4698 ANGIOGRAPHIC DIAGNOSIS OF SMALL INTESTINAL CARCINOIDS. (Ger.) Schmidt, K. R.; Pfeifer, K. J.; Spelsberg, F. (Rontgenabt. der Chirurgischen Klinik, Universitat Munchen, Nussbaumstrasse 20, D-8000 Munich, W. Germany). *Strahlentherapie* 153(10):668-673; 1977.

The angiographic diagnosis of metastasizing small intestinal carcinoid in two women aged 61 and 65 yr, resp., is described. Conventional x-ray examinations (gastrointestinal passage and colon irrigoscopy) failed to furnish a correct diagnosis. The carcinoid of the ileum was diagnosed by arteriography of the superior mesenteric artery and hepatic artery. In one case, the vascular changes in the lower ileum, combined with numerous hypervascularized metastases in the liver, allowed diagnosis of the primary tumor and identification of its type. In the second case, the correct diagnosis was established solely on the basis of the specific vascular alterations, which indicated the infiltrating carcinoid (vascular star, missing parenchymatous change, belated venous drainage in the tumor region). The findings indicate that to improve prognosis arteriography should be used for early diagnosis whenever a metastasizing small intestinal carcinoid is suspected.

4699 ARTERIOMESENTERIC OBSTRUCTION OF THE DUODENUM. (Ger.) Wendt, F.; Hofmann, H.; Wiedemann, F. H.; Zimmermann, H. B.; Vogel, S. (II. Medizinische Klinik des Bereichs Medizin [Charite], Humboldt-Universitat, Schumannstrasse 20, DDR-104 Berlin, E. Germany). *Zentralbl. Chir.* 102(18): 1102-1109; 1977.

Chronic arteriomesenteric duodenal stenosis was diagnosed in four women during a 5-yr period. Postprandial nausea and emesis were the common symptoms; two patients also complained about postprandial epigastric pains. Pathological changes were revealed in all cases by infusion cholangiography. Blood and urine chemistry were normal. Retrocolic side-to-side jejunostomy with Braun's anastomosis was performed in all cases. A firm and tense mesenteric vascular band compressing the transverse part of the duodenum was found in all cases. The oral parts of the duodenum were distended and inflated. The surgery was successful in all four cases.

4700 IN VITRO SENSITIZATION AND MAST CELL DEGRANULATION IN HUMAN JEJUNAL MUCOSA. (Eng.) Selbekk, B. H.; Aas, K.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 13(1):87-92; 1978.

The degree of mast cell degranulation was studied in sensitized jejunal mucosa. Sera from three allergic patients with specific IgE antibodies as shown by radioallergosorbent test were used to sensitize jejunal mucosa obtained from surgical patients. The sensitized specimens were challenged with the appropriate antigens to the specific IgE shown in the sera. Nonchallenged sensitized specimens were used as controls to determine mast cell degranulation. The mast cells were counted in a defined area in the mucosa immediately adjacent to the muscularis mucosa. Mast cell degranulation was 4% in a timothy pollen system, 40% in an egg-white system, and 33% in a codfish system. The results indicate that mast cells in the human jejunal mucosa react in the same manner as mast cells in other organs when they are sensitized by IgE antibodies and are challenged with the appropriate antigen. The results further support reports that allergic reactions of the immediate hypersensitivity type may result in a number of gastrointestinal diseases. The experimental model described appears suitable for studying the allergic reaction in the gastrointestinal tract and the effect of pharmacotherapy in this respect.

4701 EPITHELIAL CELL TURNOVER AND MUCUS PRODUCTION IN MAN. (Eng.) Croft, D. N.; Domschke, W.; Domschke, S.; Hagel, J.; Demling, L. (St. Thomas' Hosp., London, SE1 7EH, England). *Adv. Exp. Med. Biol.* 89:39-50; 1977.

4702 INTESTINAL PNEUMATOSIS: A REPORT OF TWO CASES. (Eng.) Gandhi, A. G.; Joshi, M. J. (No affiliation given). *Am. J. Proctol.* 28(3):45-50; 1977.

4703 NONROTATION OF THE SMALL BOWEL AND INVERSION OF THE STOMACH: CASE REPORT. (Eng.) Rodriguez, M. A. (Univ. North Dakota Sch. Medicine, Grand Forks, ND 58202). *Milit. Med.* 142(10):795-797; 1977.

4704 DUODENAL ATRESIA WITH BILIARY ANOMALIES AND UNUSUAL GAS PATTERN. (Eng.) Raine, P. A. M.; Noblett, H. R. (Royal Children's Hosp., Flemington Rd., Parkville, Victoria 3052, Australia). *J. Pediatr. Surg.* 12(5):763-765; 1977.

4705 DUODENAL OBSTRUCTION IN A NEWBORN SECONDARY TO A MULTICYSTIC KIDNEY. (Eng.) Porterfield, G. N.; Campbell, D. P. (Univ. Oklahoma Health Sciences Center, P.O. Box 26901, Oklahoma City, OK 73190). *J. Pediatr. Surg.* 12(5): 767-769; 1977.

4706 DELAYED APPEARANCE OF A LEFT POSTEROLATERAL DIAPHRAGMATIC HERNIA RESULTING IN SIGNIFICANT SMALL BOWEL NECROSIS. (Eng.) Woolley, M. M. (Children's Hosp. Los Angeles, 4650 Sunset Blvd., Los Angeles, CA 90054). *J. Pediatr. Surg.* 12(5):673-674; 1977.

4707 ISOLATED PERFORATIONS OF THE ILEUM AND JEJUNUM IN BLUNT ABDOMINAL TRAUMA. (Eng.) Musa, M. B.; Meah, F. (General Hosp., Kuala Lumpur, Malaysia). *Aust. N.Z. J. Surg.* 47(4):526-528; 1977.

4708 TUBERCULOSIS AFTER JEJUNOILEAL BYPASS FOR OBESITY. (Eng.) Bruce, R. M.; Wise, L. (Pulmonary Div., Washington Univ., 660 S. Euclid Ave., St. Louis, MO 63110). *Ann. Intern. Med.* 87(5):574-576; 1977.

4709 AN ULTRASTRUCTURAL STUDY OF THE BRUNNER'S CYST. (Eng.) Taura, M.; Taura, S.; Kummerow, F. A.; Noritomi, S.; Iwanaga, S. (Burnsides Res. Lab., Univ. Illinois at Urbana-Champaign, Urbana, IL 61801). *Gastroenterol. Jpn.* 12(3): 241-244; 1977.

4710 BODY COMPOSITION AND ADIPOSE TISSUE CELLULARITY BEFORE AND AFTER JEJUNOILEOSTOMY IN SEVERELY OBESE SUBJECTS. (Eng.) Kral, J. G.; Bjorntorp, P.; Schersten, T.; Sjostrom, L. (Sahlgren's Hosp., S-413 45 Gothenburg, Sweden). *Eur. J. Clin. Invest.* 7(5):413-419; 1977.

4711 ETIOLOGY OF CONGENITAL INTRINSIC DUODENAL OBSTRUCTION: WITH SPECIAL REFERENCE TO THE T-SHAPED BILE DUCT ANOMALY. (Eng.) Yura, J.; Takahashi, H.; Shibata, K. (Nagoya City Univ. Medical Sch., Mizuho-ku, Nagoya, 467, Japan). *Arch. Jpn. Chir.* 46(5):615-620; 1977.

4712 A CRITICAL ANALYSIS OF 51 PATIENTS WITH JEJUNOILEAL BYPASS. (Eng.) Mersheimer, W. L.; Kazarian, K. K.; Dursi, J. F. (New York Medical Coll., New York, NY). *Surg. Gynecol. Obstet.* 745(6):847-852; 1977.

4713 SPONTANEOUS NECROTIZING FASCIITIS: OCCURRENCE SECONDARY TO OCCULT DIVERTICULITIS. (Eng.) Galbut, D. L.; Gerber, D. L.; Belgraier, A. H. (Columbia Univ., Coll. Physicians and Surgeons, 630 W. 168th St., New York, NY 10032). *JAMA* 238(21):2302; 1977.

4714 BLEEDING INTESTINAL VARICES ASSOCIATED WITH PORTAL HYPERTENSION AND PREVIOUS ABDOMINAL SURGERY. (Eng.) Fee, H. J.; Taylor, J. B.; O'Connell, T. X. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA 90024). *Am. Surg.* 43(11):760-762; 1977.

4715 THE PEUTZ-JEGHERS SYNDROME: A 39-YEAR CLINICAL AND RADIOGRAPHIC FOLLOW-UP REPORT [Letter to Editor]. (Eng.) Long, J. A., Jr.; Dreyfuss, J. R. (Massachusetts General Hosp., Boston, MA 02114). *N. Engl. J. Med.* 297(19):1070; 1977.

4716 INTRACELLULAR FAT TRANSPORT AND ITS DISTURBANCE [Abstract]. (Eng.) Sano, M.; Sasagawa, T. (City Hosp., Niigata, Japan). *Gastroenterol. Jpn.* 12(4):322-323; 1977.

4717 BOWEL PERFORATION WITH CANDIDIASIS. (Eng.) Schlossberg, D.; Devig, P. M.; Travers, H.; Kovalcik, P. J.; Mullen, J. T. (Polyclinic Medical Center, Harrisburg, PA 17105). *JAMA* 238(23):2520-2521; 1977.

4718 EXTERNAL DUODENAL FISTULA. (Eng.) Anderson, G. W.; Goss, J. C.; Lawrence, G. H. (Good Samaritan Hosp., Portland, OR). *Am. Surg.* 43(10):666-669; 1977.

4719 RESULTS OF JEJUNOILEAL BYPASS IN TWO HUNDRED PATIENTS WITH MORBID OBESITY. (Eng.) Scott, H. W., Jr.; Dean, R. H.; Shull, H. J.; Gluck, F. (Vanderbilt Univ. Medical Center, Nashville, TN). *Surg. Gynecol. Obstet.* 145(5): 661-673; 1977.

4720 ACUTE REVERSIBLE RENAL FAILURE FOLLOWING JEJUNOILEAL BYPASS FOR MORBID OBESITY: A CLINICAL AND PATHOLOGICAL (EM) STUDY OF A CASE. (Eng.) Ehlers, S. M.; Posalaky, Z.; Strate, R. G.; Quattlebaum, F. W. (St. Paul-Ramsey Hosp. and Medical Center, St. Paul, MN 55101). *Surgery* 82(5):629-634; 1977.

4721 ISCHAEMIC ILEAL NECROSIS AND CARCINOID TUMOUR. (Eng.) Chapuis, P.; Weedon, D. (Royal Brisbane Hosp., Herston, Brisbane, Queensland 4029, Australia). *Aust. N.Z. J. Surg.* 46(1): 63-64; 1976.

See also, 4295, 4400, 4492, 4498, 4505, 4531, 4534, 4539, 4550, 4554, 4586, 4656, 4664, 4746, 4748, 4758, 4769, 4776, 4985, 5002, 5005, 5009, 5012, 5013, 5016, 5017, 5019, 5024, 5025, 5027, 5029, 5034, 5035, 5037, 5041, 5043, 5050, 5051, 5056.

SMALL INTESTINE

Malabsorption

4722 COELIAC DISEASE IN SUDANESE CHILDREN. (Eng.) Suliman, G. I. (P.O. Box 412, Khartoum, Sudan). *Gut* 19(2):121-125; 1978.

Seven Sudanese children with celiac disease, of whom two are siblings, are described. They all had evidence of impaired intestinal absorption and severe histological changes of their jejunal mucosa with clinical and histological improvement on gluten-free/sorgham-free diets. Subsequently, one patient had a clinical relapse when gluten was reintroduced; four had positive gluten challenge using serial

1-hr blood xylose estimations. All patients belonged to the upper socioeconomic group of the society in the north of Sudan.

4723 REPORT OF A CASE OF HEREDITARY FRUCTOSE INTOLERANCE. (Ita.) Colombini, G.; Morandi, P.; Martello, M. T. (Ente Ospedaliero, Melzo-Gorgonzola, Italy). *Terapia* 62(443):34-37; 1977.

4724 SEVERE KERATITIS DUE TO HYPOVITAMINOSIS A IN A PATIENT WITH GLUTEN ENTEROPATHY. (Ita.) Martinucci, M.; Adami-Lami Conti, C.; Calandi, C. (Istituto di Clinica Pediatrica dell' Universita di Firenze, Florence, Italy). *Minerva Pediatr.* 29(13):931-934; 1977.

See also, 4490, 4585, 4715, 4716, 5013, 5050, 5056.

LARGE INTESTINE

4725 THE RADIOLOGICAL SIGNS OF ACUTE APPENDICITIS IN INFANCY AND CHILDHOOD. (Eng.) Isdale, J. M. (Transvaal Memorial Hosp. for Children, Johannesburg, South Africa). *S. Afr. Med. J.* 53 (10):363-364; 1978.

To assess the diagnostic value of radiology in appendicitis, the radiological findings in 93 children operated on for acute appendicitis were reviewed retrospectively. Acute appendicitis was confirmed in 76. These children were compared with 40 children with abdominal pain, but without appendicitis. Preoperative radiographs in the children with appendicitis showed a significantly higher incidence of scoliosis, properitoneal line displacement, cecal dilatation with air/fluid levels, and terminal ileal dilatation with air/fluid levels ($p<0.001$) than in the controls. The incidence of radiologically demonstrable fecaliths was not significantly higher in the children with acute appendicitis. In children under the age of 4 yr, in whom the diagnosis of acute appendicitis is often difficult, the radiological signs are helpful.

4726 INHIBITION OF ROSETTE FORMATION BY ANTITHYMOCYTE GLOBULIN: AN INDICATOR FOR T-CELL COMPETENCE IN COLORECTAL CANCER PATIENTS. (Eng.) Ichiki, A. T.; Collmann, I. R.; Sonoda, T.; MacGuire, J. A.; Wenzel, K. L.; Krauss, S. (Univ. Tennessee Memorial Res. Center, 1924 Alcoa Highway, Knoxville, TN 37920). *Cancer Immunol. Immunother.* 3(2):119-124; 1977.

The peripheral WBC from 29 patients with adenocarcinoma of the colon were studied sequentially for the thymus-derived cell (T-cell) level, the rosette-inhibition titer of antithymocyte globulin, and the blastogenic response to phytohemagglutinin (PHA) and concanavalin A (Con A) to evaluate the T-cell immunocompetence. The level of E-rosette-forming cells and the blastogenic response did not reflect the immunocompetence of the T-cell population. Fluctuations in the rosette-inhibition titer of antithymocyte globulin (ATG) were observed. An increased ATG titer indicated an unfavorable clinical course, while a decreased ATG titer was observed with patients who had a favorable clinical course. The rosette-inhibition titer with antithymocyte globulin was an important indicator of competent T cells in patients with colorectal cancer.

4727 SYSTEMIC ADJUVANT IMMUNOTHERAPY AND CHEMOIMMUNOTHERAPY IN PATIENTS WITH COLORECTAL CANCER (DUKES' C CLASS): PROLONGATION OF DISEASE FREE INTERVAL AND SURVIVAL. (Eng.) Mavligit, G. M.; Gutterman, J. U.; Malahy, M. A.; Burgess, M. A.; McBride, C. M.; Jubert, A.; *et al.* *In: Adjuvant Therapy of Cancer.* Edited by S. E. Salmon and S. E. Jones. (Amsterdam: Elsevier/North-Holland Biomedical Press): 279-286; 1977.

In an effort to improve the treatment of colorectal cancer patients, 121 patients who underwent surgery between 1973-1976 for carcinoma of the large bowel, Dukes' C classification (involvement of regional lymph nodes without invasion of adjacent structure or distant organs), were entered into a clinical trial of adjuvant therapy. Fifty-two patients received *bacillus Calmette-Guerin* (BCG) by scarification, and 69 received the combination of 5-fluorouracil (5-FU) p.o. and BCG as described in a previous paper. Treatment evaluation in terms of disease-free interval and overall survival was compared with the same clinical parameters in a consecutive series of comparable historical surgical control patients operated on between 1963-1973. No difference was observed between BCG alone and the combination of 5-FU and BCG in terms of either the disease-free interval or the survival rate. Both treatments, however, significantly prolonged survival ($p<0.002$) when compared with the controls. There was a marked shift in the prognosis of adjuvant-treated C patients toward that of surgically-treated Dukes' B patients in whom a 60% 5-yr survival can be anticipated compared to 35% for surgically-treated Dukes' C patients. There were 26 relapses among 84 patients with primary carcinoma of the rectosigmoid, 18 occurring locally, but only 8 relapses among 37 patients with primary carcinoma arising proximal to the rectosigmoid, 2 occurring locally (p=0.07). This relapse pattern among patients receiving adjuvant therapy demonstrates a need for augmented protection against local recurrence, perhaps by administration of postoperative radiotherapy. Adjuvant therapy, especially with BCG, is advocated for patients with colorectal carcinoma, Dukes' C class, following potentially curative surgery.

4728 COLONIC AND RECTAL VILLOUS TUMORS. COMPARATIVE ANALYSIS OF SURGERY AND RADIOTHERAPY. REPORT OF 104 CASES. (Fre.) Raymond, A.; Horiot, J. C.; Guillaud, M.; Papillon, J.; Guillemin, G. (Hotel-Dieu, 74, boulevard des Belges, 69006 Lyon Cedex, France). *J. Chir. (Paris)* 114(3): 153-165; 1977.

The efficacy of surgery and radiotherapy was studied in two series of patients with colorectal villous tumors. Forty-six patients (series I) underwent surgery; local excision was performed in 24 cases, radical resection (colectomy, anterior resection, pull through, Hartmann operation) in 17, and amputation in 5. The postoperative mortality was 3/46. Thirty-nine patients were under observation for 1-17 yr (average, 3 yr). The recurrence rate was 12/39; 9 of the recurrent tumors were benign and the others were malignant. Most of the recurrences developed after local excision. The recurrences were treated successfully by contact radiotherapy or local or radical resection. Thirty-two of the 39 patients have been tumor-free for an average of 3 yr. Another 57 patients (series II) received contact radiotherapy (surface dose 2,000-4,000 rads/session, 4-6 sessions at 8- to 15-day intervals, total dose 8,000-20,000 rads) or interstitial radiotherapy with radium or iridium. Twenty-one of these patients received radiotherapy for recurrent tumors after surgery (group 1), 13 received prophylactic irradiation after surgery (group 2), and 23 underwent primary curative radiotherapy (group 3). The cure rates were 13/21, 10/13, and 18/23 in groups 1, 2, and 3, resp. The findings indicate that therapy should first be surgical, but that adjuvant radiotherapy may be beneficial when the tumor is malignant and noninvasive or in the event of recurrence. Curative radiotherapy is on the exceptional occasion possible in the case of tumors less than 3 cm in diameter and situated at less than 12 cm from the anus.

4729 ANTIBIOTIC-ASSOCIATED PSEUDOMEMBRANOUS COLITIS DUE TO TOXIN-PRODUCING CLOSTRIDIA. (Eng.) Bartlett, J. G.; Chang, T. W.; Gurwith, M.; Gorbach, S. L.; Onderdonk, A. B. (Veterans Admin. Hosp., 150 S. Huntington Ave., Boston, MA 02130). *N. Engl. J. Med.* 298(10):531-534; 1978.

To examine the etiologic relationship between pseudomembranous colitis and antimicrobic therapy, the stools of 4 patients with clindamicin- or cephalothin-induced pseudomembranous colitis, 54 patients with antibiotic-associated diarrhea, 10 patients without diarrhea who had received antibiotics, and 14 untreated controls without gastrointestinal symptoms were examined for cytotoxicity in tissue culture and for the ability to produce *Clostridia* overgrowth in the hamster colon. A substance producing cytotoxicity in tissue culture was detected in stool specimens from all 4 patients with pseudomembranous colitis due to antibiotics and in 1 of the 54 with antibiotic-associated diarrhea. These stools also caused enterocolitis when injected intracecally into hamsters. On each occasion, cytotoxicity in tissue culture and enterocolitis in hamsters were neutralized by pretreatment with gas gangrene antitoxin. The toxicity in both tissue cultures and hamsters could be reproduced with broth cultures of *Clostridia* strains isolated from four of the five stools. These results suggest that toxin-producing *Clostridia* are responsible for antibiotic-associated pseudomembranous colitis.

4730 OPERATIVE ENDOSCOPY OF POLYPOID COLONIC CHANGES. (Ger.) Brandstatter, G.; Kratochvil, P. (II. Medizinische Abteilung, Landeskrankenhaus, Auenbruggerplatz 1, A-8036 Graz, Austria). *Acta Chir. Austriaca* 9(1):14-17; 1977.

Endoscopic polypectomy by means of a diathermy loop was performed in 37 patients presenting with 41 colonic polyps. All polyps were pedunculated or narrow-based (endoscopic resection of sessile polyps was considered contraindicated). Forty polyps were identified morphologically; they included 34 polypoid adenomas (including 1 with focal carcinoma), 3 papillary adenomas, 1 villous adenoma, 1 hyperplastic polyp, and 1 inflammatory pseudopolyp. The complications included arterial hemorrhage in one case. The polypectomy ulcers healed in about 2 weeks. Endoscopic polypectomy alone is sufficient in the case of pedunculated polyps with focal carcinoma due to the absence of metastases, and in the case of adenocarcinoma with degree I and II of malignancy. Resection is always indicated, however, in the case of adenocarcinoma with degree III of malignancy and in anaplastic carcinoma.

4731 EPITHELIAL CELL KINETICS IN THE CRYPTS OF FAMILIAL POLYPOSIS OF COLON. (Eng.) Iwama, T.; Utzunomiya, J.; Sasaki, J. (Tokyo Medical and Dental Univ., Tokyo, Japan). *Jpn. J. Surg.* 7(4):230-234; 1977.

Epithelial cell kinetics were examined in the uninvolved part of the rectal mucosa in nine patients with familial polyposis of colon, six first degree relatives, and six controls. Biopsy specimens were incubated for 2 hr in culture medium containing ^{3}H-thymidine. In all but one of the controls, the proliferating zone was confined to the lower two-thirds of the crypt. Six of the nine patients with familial polyposis had crypts with an altered proliferating zone; ^{3}H-thymidine incorporation was observed in the upper third of the crypt. Three of six first-degree relatives showed these changes.

These results suggest the possibility of the detection of the latent patients with familial polyposis colon by autoradiography of the rectal mucosa.

4732 THE COLONOSCOPE IN CECAL VOLVULUS: REPORT OF THREE CASES. (Eng.) Anderson, M. J.; Okike, N.; Spencer, R. J. (Mayo Clinic, West 4[A], Rochester, MN 55901). *Dis. Colon Rectum* 21(1):71-74; 1978.

Colonoscopy was employed to attempt detorsion of volvulus of the right colon in three patients considered to be high-risk surgical patients. In one patient, detorsion was accomplished, making emergency laparotomy unnecessary. The site of torsion was reached in every patient. The authors feel that when detorsion does not occur within half an hour after the colonoscope enters the right colon, persistent efforts are more likely to be harmful than helpful. Early diagnosis and earlier employment of colonoscopy should result in an increased rate of success in accomplishing detorsion. When detorsion is accomplished, subsequent resection of the right colon should be seriously considered to prevent recurrence.

4733 ACUTE DIVERTICULITIS IN THE YOUNG ADULT. (Eng.) Homer, M. J.; Danford, R. O. (Tufts-New England Medical Center, 171 Harrison Ave., Boston, MA 02111). *Radiology* 125(3):623-626; 1977.

4734 ACUTE APPENDICITIS WITH ABSCESS SIMULATING CARCINOMA OF THE SIGMOID. (Eng.) Halls, J. M.; Meyers, H. I. (Los Angeles County-Univ. Southern California Medical Center, 1200 North State St., Los Angeles, CA 90033). *Am. J. Roentgenol.* 129(6):1057-1059; 1977.

4735 BENIGN NONEPITHELIAL TUMORS OF THE LARGE INTESTINE. (Eng.) Berardi, R. S. (Veterans Admin. Hosp., 30th and Euclid, Des Moines, IA 50310). *Am. J. Proctol.* 28(6):36-42; 1977.

4736 COMPLETE PROLAPSE (PROCIDENTIA) OF THE RECTUM: A CONTRIBUTION TO THE SURGICAL TREATMENT. (Eng.) Cassimally, K. A. I. (Fort Pierce Memorial Hosp., Fort Pierce, FL). *Am. J. Proctol.* 28(6):52-56; 1977.

4737 ENCOPRESIS: A GOOD RESULT IN A BOY WITH UTP (URIDINE-5-TRIPHOSPHATE). (Eng.) Musicco, N. (No affiliation given). *Am. J. Proctol.* 28(6):43-46; 1977.

4738 PROPIONIC ACIDEMIA AND ANORECTAL ANOMALIES IN THREE SIBLINGS. (Eng.) Branski, D.; Gale, R.; Gross-Kieselstein, E.; Abrahamov, A. (Children's Hosp., 219 Bryant St., Buffalo, NY 14222). *Am. J. Dis. Child.* 131(12):1379-1381; 1977.

4739 PREOPERATIVE BOWEL PREPARATION: ERYTHROMYCIN BASE SERUM AND FECAL LEVELS FOLLOWING ORAL ADMINISTRATION. (Eng.) Nichols, R. L.; Condon, R. E.; DiSanto, A. R. (Tulane Univ. Sch. Medicine, 1430 Tulane Ave., New Orleans, LA 70112). *Arch. Surg.* 112(12):1493-1496; 1977.

4740 FAMILIAL POLYPOSIS IN A FAMILY. (Eng.) Amirkhan, A. D.; Farhad, M.; Daneshgar, H.; Khorasani, K. (Medical Univ. Isfahan, Isfahan, Iran). *Abdom. Surg.* 19(5):105-106; 1977.

4741 RECTAL BIOPSY IN ULTRASHORT SEGMENTS (HIRSCHSPRUNG'S DISEASE). (Eng.) Martinez-Almoyna, C.; Monereo, G. (Clinica Infantil "La Paz," C.S. de la S.S. "La Paz," Avda. Generalisimo, 177, Madrid-20, Spain). *Z. Kinderchir.* 22(2):152-159; 1977.

4742 ADENOCARCINOMA IN TUBULAR DUPLICATION OF THE SIGMOID COLON. (Eng.) Arkema, K. K.; Calenoff, L. (Northwestern Memorial Hosp., 303 East Superior, Chicago, IL 60611). *Gastrointest. Radiol.* 2(2):137-139; 1977.

4743 YERSINIA COLITIS. (Eng.) Lachman, R.; Soong, J.; Wishon, G.; Maenza, R.; Hanelin, L.; St. Geme, J. (Univ. California at Los Angeles-Harbor General Hosp., Box 27, 1000 West Carson St., Torrance, CA 90509). *Gastrointest. Radiol.* 2(2):133-135; 1977.

4744 COMPUTER-AIDED PREDICTION OF GANGRENOUS AND PERFORATING APPENDICITIS. (Eng.) Graham, D. F. (Univ. Dept. Surgery, Edinburgh EH8 9AG, Scotland). *Br. Med. J.* 2(6099):1375-1377; 1977.

4745 PNEUMATOSIS AND CYSTOIDES INTESTINALIS: REPORT OF A CASE WITH COLONOSCOPIC FINDINGS OF INFLAMMATORY BOWEL DISEASE. (Eng.) Forde, K. A.; Whitlock, R. T.; Seaman, W. B. (Columbia Univ. Coll. Physicians and Surgeons, New York, NY). *Am. J. Gastroenterol.* 68(2):188-190; 1977.

4746 INTESTINAL OBSTRUCTION DUE TO A DEFECT IN THE OMENTUM. (Eng.) McCredie, J. A. (Victoria Hosp., 375 South St., London, Ontario N6A 5A5, Canada). *Can. J. Surg.* 20(6):560-562; 1977.

4747 ARTHRITIS ASSOCIATED WITH AMPICILLIN COLITIS. (Eng.) Rothschild, B. M.; Masi, A. T.; June, P. L. (Univ. Tennessee Center Health Sciences, 858 Madison Ave., Memphis, TN 38163). *Arch. Intern. Med.* 137(11):1605-1607; 1977.

4748 ILEOCOLIC INTUSSUSCEPTION--A CASE REPORT. (Eng.) Burke, L. F.; Clark, E. (Portland

Adventist Hosp., Portland, OR 97215). *J. Clin. Ultrasound* 5(5):346-347; 1977.

4749 MESENCHYMAL CHONDROSARCOMA OF THE RECTUS SHEATH: CASE REPORT WITH ULTRASONIC FINDINGS. (Eng.) O'Malley, B. P.; Qizilbash, A. H. (Henderson General Hosp., Concession St., Hamilton, Ontario L8V 1C3, Canada). *J. Clin. Ultrasound* 5(5):348-349; 1977.

4750 INTESTINAL OBSTRUCTION: A COMPLICATION OF PERCUTANEOUS CYSTOTOMY. A CASE REPORT. (Eng.) Moody, T. E.; Howards, S. S.; Schneider, J. A.; Rudolf, L. E. (Univ. Virginia Sch. Medicine, Charlottesville, VA). *J. Urol.* 118(4):680; 1977.

4751 VOLVULUS OF THE CECUM FOLLOWING TRANSPLANT DONOR NEPHRECTOMY. (Eng.) Etheredge, E. E.; Martz, M.; Anderson, C. B. (Washington Univ. Sch. Medicine, 4960 Audubon Ave., St. Louis, MO 63110). *Surgery* 82(5):764-767; 1977.

4752 RECENT ADVANCES IN COLORECTAL SURGERY. (Eng.) Pheils, M. T. (Repatriation General Hosp., Concord, New South Wales 2139, Australia). *Aust. N.Z. J. Surg.* 47(4):442-445; 1977.

4753 PSEUDOMEMBRANOUS COLITIS: A REVIEW. (Eng.) Smith, C. (Truman Medical Center, Columbia, MO). *Mo. Med.* 74(10):593-596; 1977.

4754 COMPARATIVE EVALUATION OF THE COMMONLY PERFORMED EMERGENCY PROCEDURES FOR THE PREVENTION OF RECURRENCE OF SIGMOID VOLVULUS. (Eng.) Bhatnagar, B. N. S.; Roy, S. K.; Chakravarty, M. R. (Inst. Medical Sciences, Banaras Hindu Univ., Varanasi-221005, India). *Am. J. Proctol.* 28(5): 35-44; 1977.

4755 ANORECTAL EXCISIONAL MYOMECTOMY FOR DISTAL SHORT SEGMENT HIRSCHSPRUNG'S DISEASE. (Eng.) Lee, Y. K.; Koh, Y. B. (St. Mary's Hosp., Seoul, South Korea). *Am. J. Proctol.* 28(5):52-58; 1977.

4756 THE ANAL CRYPTS AND GLANDS AND A NEW, GROOVED CRYPT HOOK. (Eng.) Abramson, D. J. (Walter Reed Army Medical Center, Washington, DC 20012). *Am. J. Proctol.* 28(5):59-61; 1977.

4757 COLO-COLIC INTUSSUSCEPTION DUE TO A HEMANGIOMA. (Eng.) Bower, R. J.; Kiesewetter, W. B. (Children's Hosp., 125 Desoto St., Pittsburgh, PA 15213). *J. Pediatr. Surg.* 12(5):777-778; 1977.

4758 SALT-LOADING REDUCED FUNCTIONAL BUT NOT MORPHOLOGICAL ADAPTATION OF THE ILEUM AFTER COLECTOMY. (Eng.) Paschal, G. W.; Low, R.; Tilson, M. D.; Wright, H. K. (Yale Univ. Sch. Medicine, New Haven, CT). *Surg. Forum* 28:438-439; 1977.

4759 THE DIAGNOSTIC VALUE OF SERUM LYSOZYME ACTIVITY IN INFLAMMATORY BOWEL DISEASE. (Eng.) Ayulo, J. A.; Chen, C. C.; Pelot, D.; Berk, J. E. (Coll. Medicine, Univ. California, Irvine, CA). *Am. J. Gastroenterol.* 68(1):71-76; 1977.

4760 TOTAL AND SUBTOTAL COLONOSCOPY WITH SHORT INSTRUMENT AND WITHOUT FLUOROSCOPY. (Eng.) Cronstedt, J.; Deurell, S. I.; Vestergaard, P. (Bollnas Hosp., Bollnas, Sweden). *Acta Med. Scand.* 202(4):265-269; 1977.

4761 TREATMENT OF SESSILE VILLOUS AND TUBULO-VILLOUS ADENOMAS OF THE RECTUM: EXPERIENCE OF ST. MARK'S HOSPITAL, 1963-1972. (Eng.) Thomson, J. P. S. (St. Mark's Hosp., City Rd., London EC1V 2PS, England). *Dis. Colon Rectum* 20(6):467-472; 1977.

4762 DIVERTICULAR DISEASE OF THE APPENDIX. (Eng.) Payan, H. M. (Bell Memorial Hosp., Ishpeming, MI 49849). *Dis. Colon Rectum* 20(6): 473-476; 1977.

4763 DIVERTICULOSIS OF THE COLON IN ISRAEL. (Eng.) Levy, N.; Luboshitzki, R.; Shiratzki, Y.; Ghivarello, M. (Rothschild Univ. Hosp., P.O. Box 4940, Haifa, Israel). *Dis. Colon Rectum* 20(6):477-481; 1977.

4764 THE IRRITABLE BOWEL SYNDROME. (Eng.) Drossman, D. A.; Powell, D. W.; Sessions, J. T., Jr. (Univ. North Carolina, Sch. Medicine, Chapel Hill, NC 27514). *Gastroenterology* 73(4, Part 1):811-822; 1977.

4765 PSEUDO-OBSTRUCTION OF THE COLON (OGILVIE'S SYNDROME), A GENUINE CLINICAL CONDITION? REVIEW OF THE LITERATURE (1948-1975) AND REPORT OF

FIVE CASES. (Eng.) Soreide, O.; Bjerkeset, T.; Fossdal, J. E. (Univ. Hosp. Bergen, 5016 Haukaland Sykehus, Bergen, Norway). *Dis. Colon Rectum* 20(6): 487-491; 1977.

4766 ABDOMINAL MASS AND COLONIC PERFORATION IN A CASE OF THE HEMOLYTIC-UREMIC SYNDROME. (Eng.) Liebhaber, M. I.; Parker, B. R.; Morton, J. A.; Tune, B. M. (Stanford Univ. Hosp., 520 Willow Rd., Palo Alto, CA 94304). *Am. J. Dis. Child.* 131(10):1168-1169; 1977.

See also, 4289, 4499, 4534, 4550, 4554, 4587, 4590, 4592, 4701, 4768, 4770, 4794, 4795, 4822, 4999, 5001, 5002, 5005, 5013, 5016, 5017, 5019, 5024, 5025, 5027, 5029, 5034, 5037, 5038, 5041, 5043, 5045, 5051, 5064.

LARGE INTESTINE

Ulcerative Colitis

4767 THE HUMORAL IMMUNE SYSTEM IN INFLAMMATORY BOWEL DISEASE. II. IMMUNOGLOBULIN LEVELS. (Eng.) Hodgson, H. J. F.; Jewell, D. P. (Royal Free Hosp., London NW3, England). *Am. J. Dig. Dis.* 23 (2):123-128; 1978.

Serum IgG, IgA, and IgM were estimated in 93 patients with ulcerative colitis, 65 patients with Crohn's disease, and 52 hospitalized controls, and the results correlated with the clinical features of the patients. Although a significantly higher mean IgG level in ulcerative colitis compared to Crohn's disease was confirmed ($p<0.005$), no difference was found when the comparison was limited to patients with colonic Crohn's disease. Patients with either disease had higher mean IgM levels than controls ($p<0.001$), and the IgM levels were higher on treatment with corticosteroids ($p<0.05$ for ulcerative colitis, $p<0.02$ for Crohn's disease) and showed a tendency to rise in remission. IgG and IgM levels were also higher in both diseases if extra-intestinal manifestations were present ($p<0.0005$). It is concluded that if clinical features, particularly disease site, are taken into account, the overall immunoglobulin responses in these two diseases show no differences.

4768 THE EPITHELIAL CELL GRANULOMA. DIAGNOSTIC AND HISTOGENIC VALUE IN PROLONGED COLITIS IN CHILDREN. (Fre.) Nezelof, C.; Despres, S. (Hopital des Enfants Malades, 149 rue de Sevres, 75015 Paris, France). *Ann. Anat. Pathol. (Paris)* 22(2):171-176; 1977.

The results of rectal biopsies were compared in 22 children (aged 2-16) suffering from chronic colitis. Of these, 7 had Crohn's disease, 5 had a nonspecific colitis, and 10 had ulcerative colitis. Nodular epithelioid giant cell lesions were found in 5/10, 1/7, and 1/5 of these patients, resp. These epithelial cell granulomas denote a specific and elective destruction of glandular epithelial cells, which starts with the rupturing of the basal membranes and leads to the eventual destruction of the glandular crypt. The use of PAS and Alcian blue for staining the histologic preparations can aid in distinguishing these granulomas from the follicular lesions found in Crohn's disease. Since the onset of the damage always occurs in the basal membrane, an autoimmune mechanism is suspected.

4769 FUNCTIONAL AND HISTOLOGICAL ABNORMALITIES OF THE SMALL INTESTINAL MUCOSA IN ULCERATIVE COLITIS IN REMISSION--PRIMARY MANIFESTATIONS OF UNRECOGNIZED DISEASE [Abstract]? (Eng.) Arvanitakis, C. (Kansas Univ. Sch. Medicine, Kansas City, KS). *Gastroenterology* 72(5, Part 2):1154; 1977.

4770 KUPFFER CELL UPTAKE OF MICRO-AGGREGATED ALBUMIN: (a) IN RELATION TO LIVER BLOOD FLOW; (b) IN INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Anderson, A. J.; James, O.; Wardle, E. H. (Dept. Medicine, Univ. Newcastle upon Tyne, Newcastle upon Tyne, England). *Gastroenterology* 72(5, Part 2):1024; 1977.

4771 PULMONARY FUNCTION IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE [Abstract]. (Eng.) Eade, O. E.; Smith, C. L.; Whorwell, P. J. (Southampton Univ. Hosp., Southampton, Hants, England). *Gut* 18(5):A423; 1977.

See also, 4493, 4494, 4514, 4515, 4590, 4743, 4759, 5013, 5066.

4772 RESECTION OF THE PANCREAS: ITS EFFECT ON BONE AND CALCIUM METABOLISM. (Ger.)

Dammann, H. G.; Kruse, H. P.; Kuhlencordt, F.; Montz, R.; Schreiber, H. W. (Abteilung Klinische Osteologie, I. Medizinische Klinik, Universitat Hamburg, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Z. Gastroenterol.* 15(9):577-585; 1977.

Bone and calcium metabolism was studied in five patients 4-10 yr after total pancreatectomy (1 patient), partial pancreatectomy (3), or pancreaticojejunal anastomosis (1). The histomorphometry of the spongiosa of the iliac crest (determination of the volumetric density and inactive surface of the spongiosa, the total osteoid surface, the osteoid surface with and without osteoblasts, the relative osteoblast activity, the total resorption surface areas, resorption lacunae with and without osteoclasts, and the relative osteoclast activity) revealed high-turnover osteoporosis. There were no signs of osteomalacia or secondary hyperparathyroidism. The serum calcium level was 8.8-10.2 mg/100 ml, the serum phosphorus level 3.2-3.8 mg/100 ml, the urinary calcium excretion 40.9-238.7 mg/day, the urinary phosphorus excretion 515-788 mg/day, and the hydroxyproline excretion 7.6-26 mg/day. The mineral content of the radius was reduced to 0.56-0.72 g/cm^2. Radiocalcium investigations following i.v. or p.o. administration of calcium isotope showed increased endogenous fecal calcium loss (366-530 mg/day versus a normal range of 130-270 mg/day) in all patients, while the intestinal absorption and renal excretion of calcium were normal. Further investigations will be necessary to explain the pathophysiological relationship between resection of the pancreas and its influence on calcium and bone metabolism.

4773 THE ROLE OF PERCUTANEOUS LIVER BIOPSY IN THE PRETREATMENT EVALUATION OF PANCREATIC ADENOCARCINOMA. (Eng.)

Bender, R. A.; Brennan, M. F. (Natl. Cancer Inst., Bldg. 10, Rm. 12N226, 9000 Rockville Pike, Bethesda, MD 20014). *Am. J. Surg.* 135(2):207-209; 1978.

Experience with 22 patients with locally unresectable adenocarcinoma of the exocrine pancreas who underwent percutaneous liver biopsies within a median of 6 weeks of laparotomy is presented. Three patients had positive biopsies obtained either blindly or at peritoneoscopy. Of these three patients, two had elevations in either alkaline phosphatase, direct bilirubin, or hepatic transaminase levels, and one of these two patients had an abnormal liver-spleen scintigram. Liver biopsies are recommended for all patients being evaluated for pancreatic resection either pre- or intraoperatively.

4774 LYMPH NODE INVOLVEMENT IN CARCINOMA OF THE HEAD OF THE PANCREAS AREA. (Eng.)

Cubilla, A. L.; Fortner, J.; Fitzgerald, P. J. (Memorial Sloan-Kettering Cancer Center, New York, NY 10021). *Cancer* 41(3):880-887; 1978.

The lymph node involvement in 33 pancreatectomy specimens (regional pancreatectomy, 18; total pancreatectomy, 7; Whipple partial pancreatectomy, 8) was studied prospectively. There were 22 patients with pancreas duct adenocarcinoma, 6 with ampullary carcinoma, 3 with duodenal adenocarcinoma, 1 with bile duct carcinoma, and 1 with carcinoma of undetermined origin. Peripancreatic lymph nodes were divided into five main groups with subgroups. They were (1) superior (superior head, superior body, and gastric), (2) inferior (inferior head and inferior body), (3) anterior (anterior pancreaticoduodenal, pyloric, and mesenteric), (4) posterior (posterior pancreaticoduodenal and common bile duct), and (5) splenic (lymph nodes at hilum of spleen and at the tail of pancreas). The average number of lymph nodes found in different types of surgical specimens was: regional pancreatectomy, 70; total pancreatectomy, 41; and Whipple procedure, 33. The average number of lymph nodes involved with metastatic tumor in these specimens was 5, 3, and 1, resp. The most common sites of metastasis were in the superior head and in the posterior pancreaticoduodenal groups. Pancreatic duct adenocarcinoma tended to metastasize to multiple lymph nodes of the superior head, superior body, and posterior pancreaticoduodenal lymph nodes (88% of patients). Ampullary adenocarcinoma metastasized less often (33%), usually to fewer nodes and to one adjacent periampullary group. Since in 33% of patients, nodal metastases of duct adenocarcinoma of the head of the pancreas were present in groups not usually removed in the Whipple procedure, it appears that this operation is inadequate for surgical eradication of pancreas duct adenocarcinoma of the head of the pancreas.

4775 WEBER-CHRISTIAN SYNDROME AND PANCREATIC CARCINOMA. REPORT OF A CASE AND REVIEW OF THE LITERATURE. (Fre.)

Delamarre, J.; Capron, J. P.; Chivrac, D.; Dupas, J. L.; Gontier, M. F.; Lorriaux, A. (Centre Hospitalier Universitaire, F 80030 Amiens Cedex, France). *Gastroenterol. Clin. Biol.* 1(10):789-798; 1977.

The association of Weber-Christian syndrome (WCS) with cancer of the pancreas was observed in a 63-yr-old man hospitalized for cutaneous nodules. Biopsy revealed fat necrosis. Pancreatic tumor, suspected clinically, biologically, and radiologically, was found at surgery. The inoperable tumor was identified as a pseudo-acinous adenocarcinoma. During the course of the disease, the patient had several cutaneous and articular crises. Death occurred 8 months after the onset of the disease. An analysis of the 25 other cases reported in the literature shows pancreatopathy in only three cases. All cases of WCS associated with pancreatic tumors were fatal, but it is unknown if WCS modifies the prognosis of pancreatic tumors in general. The pathogenesis of WCS associated with cancer of the pancreas is unknown. The subcutaneous fat necrosis in WCS is explained by the activity of pancreatic enzymes.

4776 DISACCHARIDASE ACTIVITIES IN SMALL INTESTINAL MUCOSA IN PATIENTS WITH CYSTIC FIBROSIS. (Eng.) Antonowicz, I.; Lebenthal, E.; Shwachman, H. (Harvard Medical Sch., 300 Longwood Ave., Boston, MA 02115). *J. Pediatr.* 92(2): 214-219; 1978.

The disaccharidase activities in small intestinal biopsies were related to the morphology of the mucosa and the ages of 63 patients with cystic fibrosis and 177 healthy Caucasian controls. In patients with CF and in the healthy controls under 5 yr of age with normal intestinal mucosa, no low lactase activity was found. In the 15 patients with CF who were over 5 yr of age, lactase activity was high in 11 (13.1-57.1 μM/min/g protein, mean 30.1 ± 15.8) and low in 4 (0-3.1 μM/min/g protein); in controls over 5 yr, 35 had high lactase activity (10.8-86.0 μM/min/g, mean 28.3 ± 9.0) and 8 had low activity (2.1-8.7 μM/min/g, mean 5.5 ± 1.5). These findings support the view that, in patients with CF, lactase deficiency is not related to the disease entity. In patients with or without CF who had the same degree of mucosal atrophy, the decrease of disaccharidase activities followed the same pattern, indicating that enzyme activities are affected to the same extent by the damage of the mucosa. In patients with CF with pancreatic insufficiency, the disaccharidase activities were significantly ($p<0.001$) higher when compared to those in control subjects of the same age and ethnic group, although the increase was not uniform in all patients with cystic fibrosis. The relationship between the present results and the decreased activity of pancreatic secretions found in patients with CF remains to be determined.

4777 FURTHER STUDIES INDICATING A TOXIC METABOLIC ACTION OF ALCOHOL ON PANCREATIC CELLS: CORRELATIONS WITH HEPATIC PATHOLOGY AND DIET [Abstract]. (Eng.) Bordalo, O.; Noronha, M.; Dreiling, D. (Faculty Medicine, Univ. Lisbon, Lisbon, Portugal). *Ir. J. Med. Sci.* 146(Suppl. 1): 33-34; 1977.

4778 TRASYLOL, GLUCAGON AND CIMETIDINE IN THE PROPHYLAXIS OF "SATELLITE" PANCREATIC INJURY IN THE COURSE OF OPERATIONS ON THE PAPILLA OF VATER: PRELIMINARY FINDINGS [Abstract]. (Eng.) Dobrilla, G.; Gritti, G.; Filippini, M.; Valentini, M.; Tripepi, C. (Ospedale Regionale, 1-39100 Bolzano, Bolzano, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):35-36; 1977.

4779 CYTOLOGY OF THE DUODENAL ASPIRATE COLLECTED DURING THE SECRETIN-PANCREOZYMIN TEST (VALIDITY AND LIMITS IN THE DIAGNOSIS OF PANCREATIC CARCINOMA). [Abstract]. (Eng.) Farini, R.; Matarazzo, R.; Rebuffi, A.; Costantin, G.; Pellizzari, L.; Del Favero, G.; *et al.* (Istitito Clinica Medica I, Universita Padova, Padova, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):40-41; 1977.

4780 FINDINGS BY ENDOSCOPIC RETROGRADE PANCREATOGRAPHY (ERCP), ENDOSCOPIC RETROGRADE BRUSH CYTOLOGY (ERBC) AND ENDOSCOPIC ASPIRATION CYTOLOGY (EAC) IN MALIGNANCIES OF THE PANCREAS [Abstract]. (Eng.) Osnes, M.; Serck-Hanssen, A.; Swensen, T.; Aune, S.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Ir. J. Med. Sci.* 146(Suppl. 1):27; 1977.

4781 CLINICAL APPLICATION OF RADIOISOTOPE SCANNING OF THE PANCREAS [Abstract]. (Eng.) Testa, H. J.; Prescott, M.; Braganza, J. M.; Horrance, H. B.; Howat, H. T. (Royal Infirmary, Manchester, England). *Ir. J. Med. Sci.* 146 (Suppl. 1):27; 1977.

4782 PANCREATIC JUICE RESPONSE TO SECRETIN, PANCREATIC JUICE AND SERUM CARCINOEMBRYONIC ANTIGEN (CEA) AND ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP) IN THE STUDY OF PANCREATIC DISEASE [Abstract]. (Eng.) Carr-Locke, D. L. (Dept. Medicine, Univ. Leicester, Leicester, England). *Clin. Sci. Mol. Med.* 53(3):16P; 1977.

See also, 4410, 4551, 4557, 4567, 4568, 4569, 4570, 4571, 4572, 4573, 4574, 4575, 4589, 4598, 4600, 4788, 4791, 4796, 4811, 4822, 4910, 4982, 4994, 5012, 5042.

PANCREAS

Pancreatitis

4783 PANCREATIC UPTAKE OF GALLIUM-67 CITRATE IN ACUTE PANCREATITIS. (Eng.) Tanaka, T.; Mishkin, F. S.; Buozas, D. J.; Barrett, I. R. (Martin Luther King, Jr. General Hosp., Los Angeles, CA). *Appl. Radiol.* 7(1):163-164; 1978.

To assess the sensibility of the finding of increased gallium accumulation in scans from patients with acute pancreatitis, the medical records and gallium scans of all the patients with acute or chronic pancreatitis who received the scans within a 4-yr period were reviewed. All seven patients with clinically certain acute pancreatitis demonstrated increased uptake of the nuclide in the pancreas. No pancreatic uptake appeared in studies of those patients who were diagnosed as alcoholics with chronic pancreatitis or in studies of those who had a past history of pancreatitis but did not have the acute disease when they were admitted. It is concluded that the ^{67}Ga-citrate scan can be used in confirming the diagnosis of acute pancreatitis.

4784 STUDIES ON THE ASCITES FLUID OF ACUTE PANCREATITIS IN MAN. (Eng.) Geokas, M. C.; Rinderknecht, H.; Brodrick, J. W.; Largman, C. (Veterans Admin. Hosp., Martinez, CA 94553). *Am. J. Dig. Dis.* 23(2):182-188; 1978.

The levels of total protein, α_1-antitrypsin, α_2-macroglobulin, amylase, methemalbumin, tryptic amidase activity, radioimmunoassayable elastase 2, and three lysosomal hydrolases were determined in the ascites fluid from 12 patients with acute alcoholic pancreatitis, to predict the course of the disease on the basis of one or more of these parameters. In eight patients, methemalbumin was detected in ascites and serum, supporting the diagnosis of hemorrhagic pancreatitis. Significant levels (4-45 μg/ml) of tryptic amidase activity were detected in ascites samples from all patients. Sephadex G-200 gel filtration of ascites fluid from one patient showed that tryptic amidase activity elutes as a single peak corresponding to the elution position of α_2-macroglobulin, indicating that the tryptic amidase activity is due to α_2-macroglobulin-bound trypsin. Pancreatic elastase 2, determined with a new sensitive and specific radioimmunoassay, ranged from 400 to 2,100 ng/ml in serum and from 650 to 4,460 ng/ml in ascites fluid. Substantial amounts of α_2-macroglobulin-bound trypsin and elastase 2, entering the circulation from the peritoneal cavity, might be responsible for certain serious complications seen in acute pancreatitis. However, with the exception of serum calcium and methemalbumin and the ascites fluid methemalbumin and total protein, none of the biochemical parameters studied showed a distinct correlation with the patient's outcome.

4785 GLUCAGON THERAPY IN ACUTE PANCREATITIS: REPORT OF A DOUBLE-BLIND TRIAL. (Eng.) Durr, H. K.; Maroske, D.; Zelder, O.; Bode, J. C. (Medizinische Klinik der Universitat Marburg, D-3550 Marburg/Lahn, W. Germany). *Gut* 19(3):175-179; 1978.

The value of glucagon therapy was assessed in a double-blind trial of 69 patients with acute pancreatitis. In a subgroup of 59 patients, statistical analysis showed no significant differences between the glucagon-treated ($n=29$; 2 x 5 mg protamine-zinc glucagon/day, i.m.) and the placebo-treated ($n=30$) subjects for the following data: duration of pain felt spontaneously and induced by palpation, amounts of analgesics and antispasmodics required by the patients, duration of hospital stay, serum amylase activities, and 24 hr urine collections. Mortality rates did not differ significantly between the glucagon-treated and the placebo-treated subjects in the total group of 69 patients, in the two subgroups of patients who were treated conservatively ($n=59$), or those who underwent laparotomy because of severe peritonitis ($n=10$). It is concluded that favorable effects of glucagon upon the course of acute pancreatitis, if they do exist, are not significant.

4786 PANCREATICOJEJUNOSTOMY FOR CHRONIC PANCREATITIS: TWO- TO 21-YEAR FOLLOW-UP. (Eng.) Prinz, R. A.; Kaufman, B. H.; Folk, F. A.; Greenlee, H. B. (Veterans Admin. Hosp., Hines, IL 60141). *Arch. Surg.* 113(4):520-525; 1978.

Experience with 77 patients who underwent a total of 80 pancreaticojejunostomies for intractable pain of chronic pancreatitis between 1954 and 1975 is presented. All patients had a history of chronic alcoholism. Drainage operations done primarily for pseudocysts were excluded. Operative procedures included 7 caudal pancreaticojejunostomies, 42 longitudinal pancreaticojejunostomies with splenectomy and implantation of the pancreas into the jejunum, and 31 side-to-side pancreaticojejunostomies. Eighty-one percent of the patients noted substantial improvement or complete resolution of their abdominal pain on follow-up that ranged from 2 to 21 yr. The operative mortality was 5%. Thirty-two patients died during the period of the follow-up. Continued alcohol abuse, carcinoma, and cardiovascular disease were the leading causes of mortality. The data confirm the effectiveness of pancreaticojejunostomy in relieving the pain of chronic relapsing pancreatitis.

4787 JEJUNAL MONOSACCHARIDE, WATER, AND ELECTROLYTE TRANSPORT IN PATIENTS WITH CHRONIC PANCREATITIS. (Eng.) Helman, C. A.; Barbezat, G. O.; Bank, S. (Groote Schuur Hosp., Observatory, 7925, Cape Town, South Africa). *Gut* 19(1):46-49; 1978.

Jejunal perfusion studies were carried out to assess water, electrolyte, d-xylose, and d-glucose transport in 16 patients with chronic calcific pancreatitis (8 with and 8 without steatorrhea) and in 10 controls. The patients with steatorrhea demonstrated significantly less xylose, water, and electrolyte absorption ($p<0.001$) than did patients without steatorrhea and control subjects, when an isosmotic saline-xylose solution was perfused. On the other hand, when an isosmotic saline-glucose solution was perfused, the patients with steatorrhea absorbed significantly more glucose, water, and electrolytes ($p<0.01$) than did control subjects. Significant correlation was demonstrated between the absorption of xylose as measured by the segmental perfusion technique and the peak serum xylose level during perfusion as well as the 5-hr urinary xylose excretion after a 25 g p.o. dose of xylose ($r=0.75$, $p<0.001$). The xylose absorption measured by small bowel perfusion also correlated significantly with pancreatic juice amylase and trypsin concentrations obtained during a standard pancreatic function test ($r=0.84$, $p<0.001$ and $r=0.78$, $p<0.001$, resp.). Patients with pancreatic steatorrhea have a highly significant decrease in xylose absorption by the jejunum as compared with normal controls and subjects with calcific pancreatitis without steatorrhea.

4788 SERUM ISOAMYLASE PATTERN IN OBSTRUCTIVE PANCREATIC DISEASE. (Eng.) Skude, G.; Wehlin, L.; Ohashi, K. (Malmo General Hosp., S-21401 Malmo, Sweden). *Scand. J. Gastroenterol.* 12(6):673-676; 1977.

The possibility that a serum isoamylase pattern characterized by strong activity in the anodally migrating fraction (P_0-isoamylase) might serve as a diagnostic indication of pancreatic main duct occlusion or stenosis was investigated. Pancreatic serum isoamylases were analyzed by agarose gel electrophoresis in sera from 13 patients lacking P_0-isoamylase or having it at <30 U/1, 19 patients with P_0-isoamylase activity >30 U/1, and 23 patients with endoscopically diagnosed acute pancreatitis who had had P_0-isoamylase activities <30 U/1 prior to onset of the disease. The first two patient groups underwent endoscopic retrograde cholangiopancreatography concomitantly with the enzyme determinations. Ten of the 13 patients with little or no P_0-isoamylase activity had normal pancreatograms, but 3 had pancreatitis plus stenosis or occlusion of the main pancreatic duct. Of the 19 patients with high P_0-isoamylase activity, 14 had total occlusion or stenosis of the main duct; 4 had liver, gallbladder, or pancreatic disease; and 1 had undiagnosed abdominal pain. Additionally, 18/19 had pathologically increased (45-175 U/1) total pancreatic serum amylase activity, and the P_0-isoamylase fraction constituted an average of 41% of the main activity. In the 23 cases of acute pancreatitis, P_0-isoamylase rose to only 14% of the main fraction. Almost all patients having P_0-isoamylase activity >20% of the main fraction had radiographic evidence of pancreatic main duct occlusion or stenosis with or without cysts and calculi and an increased total activity of serum pancreatic amylase. Such a finding is strong evidence of obstructive pancreatic disease, whereas findings of <20% may be regarded as normal.

4789 CURRENT STATUS OF THE SURGICAL MANAGEMENT OF ACUTE PANCREATITIS. (Ger.) Neher, M. (Chirurgische Klinik, Universitat Mainz, Langenbeckstr. 1, D-6500 Mainz, W. Germany). *Z. Gastroenterol.* 15(2):67-75; 1977.

4790 SURGICAL INDICATIONS FOR CHRONIC PANCREATITIS. (Fre.) Kiekens, R.; Kestens, P. J.; Cremer, M.; Dive, C. (Guldendal 11, B-1850 Grimbergen, Belgium). *Acta Gastroenterol. Belg.* 39(11/12):547-552; 1976.

4791 TREATMENT OF CHRONIC PANCREATITIS WITH TRIPLE TOTAL BYPASS (PANCREAS, BILE DUCT, STOMACH). A TEN-YEAR EXPERIENCE. (Fre.) Salembier, Y. (Rue de la Louviere 69, F-59000 Lille, France). *Acta Gastroenterol. Belg.* 39(11/12):603-610; 1976.

4792 POSTOPERATIVE PANCREATITIS. (Rus.) Ganchev, G.; Ivanov, S.; Kyuchukev, I.; Kraev, Z. (Clin. Surgical Propedeutics, Inst. Surgery and Anesthesiology, Medical Acad., Sofia, Bulgaria). *Khirurgiia (Mosk.)* (11):44-48; 1976.

4793 EVOLUTION OF CHRONIC PANCREATITIS FOLLOWING SURGERY. (Fre.) Gastard, J.; Gosselin, M.; Hery, B.; Bretagne, J. F. (Hopital de Pontchaillou, rue Henri Le Guillou, 35000 Rennes, France). *Ann. Chir.* 30(10):838-841; 1976.

4794 FUNCTIONAL STATUS OF THE LARGE INTESTINE IN PATIENTS WITH CHRONIC PANCREATITIS. (Rus.) Zhukov, N. A.; Ostapenko, V. A.; Zybina, L. S. (Dept. Therapy, M. I. Kalinin Omsk Medical Inst., Omsk, USSR). *Klin. Med. (Mosk.)* 54(10):94-97; 1976.

4795 COLONIC CHANGES FOLLOWING PANCREATITIS. (Ger.) Lankisch, P. G.; Lopez, E.; Winckler, K.; Schuster, R. (Medizinische Universitatsklinik, Humboldtallee 1, 3400 Gottingen, W. Germany). *Dtsch. Med. Wochenschr.* 101(51):1885-1886; 1976.

4796 CYTOMORPHOLOGY OF CHRONIC PANCREATITIS WITH CONCURRENT PANCREATIC INJURY. (Rus.) Arutinunian, L. O. (Dept. Surgery, Erevan Medical Inst., Erevan, USSR). *Zh. Eksp. Klin. Med.* 16(6):86-92; 1976.

4797 HYDROKINETIC AND EXOCRINE PANCREAS FUNCTION FOLLOWING ACUTE PANCREATITIS. (Ger.) Tympner, F.; Domschke, W.; Rosch, W.; Koch, H.; Demling, L. (Medizinische Klinik, Universitat Erlangen-Nurnberg, Krankenhausstr. 12, D-8520 Erlangen, W. Germany). *Z. Gastroenterol.* 14(7):684-687; 1976.

4798 PATHOGENESIS OF PERICARDIAC EFFUSIONS DURING CHRONIC PANCREATITIS [Letter to Editor]. (Fre.) Nataf, C.; Bernades, P.; Fruchaud, J.; Pascal, P.; Fekete, F. (Hopital Beaujon, 100, avenue General-Leclerc, F 92118 Clichy, France). *Nouv. Presse Med.* 6(24):2164; 1977.

4799 Giardia lamblia INFECTION AS A CAUSE OF ACUTE PANCREATITIS. (Pol.) Koszarska, J.; Gruszczynska, M.; Pilarska, K. (Klinika Endokrynologiczna i Chorob Przemiany Materii Pom. AM, ul. Arkonska 4, 70-252 Szczecin, Poland). *Wiad. Lek.* 30(11):875-877; 1977.

4800 ACUTE PANCREATITIS DURING Mycoplasma penumoniae INFECTION. (Ger.) Schmid, E.; Blaich, E. (II. Innere Abteilung des Kreiskrankenhauses, Eberhardtstrasse, D-7320 Goppingen, W. Germany). *Z. Gastroenterol.* 14(5):536-537; 1976.

See also, 4409, 4570, 4573, 4575, 4589, 4599, 4782, 4811, 4822, 4978, 4992, 5037, 5038, 5052.

4801 SIGNIFICANCE OF CHANGES IN BLOOD PRESSURE AND PULSE RATE AFTER PERCUTANEOUS LIVER BIOPSY. (Eng.) Middleton, H. M., III; Griffin, J. W., Jr.; Gabilondo, J. C.; Adams, H. W. (Veterans Admin. Hosp., Augusta, GA 30904). *Am. J. Dig. Dis.* 22(11):989-994; 1977.

Changes in blood pressure and pulse rate were evaluated prospectively in 50 patients undergoing uncomplicated liver biopsies and retrospectively in 4 patients who, since 1973, had recognized postbiopsy hemorrhage requiring transfusion. In uncomplicated biopsies, a wide range of variations in vital signs was encountered between "baseline" and "before" controls and between controls and postbiopsy measurements. To place the changes in perspective, percentile scales were developed for percent maximum deviation from control for systolic blood pressure, diastolic blood pressure, and pulse rate. Analysis of changes in patients with significant hemorrhage revealed marked changes in vital signs in the early (2-hr) postbiopsy period, and the association of early hypertensive changes with pain followed by later evidence of hemorrhage in two of the four patients. A change in the pulse rate occurred in only one of the four bleeders, while blood pressure changed in all four. Substantial changes from prebiopsy control values will occasionally occur and may or may not be associated with clinically significant hemorrhage. Any significant deviation, however, warrants an assessment.

4802 SIGNIFICANCE OF ALPHA$_1$-FETOPROTEIN IN THE ASSESSMENT OF HEPATOCYTE REGENERATION CAPACITY IN INFANCY AND CHILDHOOD. (Hun.) Balogh, T.; Bajtai, G.; Ambrus, M.; Peley, I.; Kadas, I.; Varga, L. (Vertranzfuzios Allomas, Baranya megyei Korhaz, Pecs, Hungary). *Orv. Hetil.* 118(47):2815-2818; 1977.

The serum alpha$_1$-fetoprotein (AFP) levels were studied in 134 0- to 42-day-old babies with respiratory infections (rhinitis, acute bronchitis, spastic bronchitis) and intact liver and in 62 4- to 56-day-old babies with perinatal hepatitis attended by IgM hypergammaglobulinemia. The AFP levels were lowest in intact controls, higher in the patients with intact liver, and highest in the patients with perinatal hepatitis. The AFP level was highest during the acute phase of the lesion of the hepatic parenchyma, and its decrease was parallel with the regeneration of the liver parenchyma. The findings show that the AFP test may be suitable for the assessment of the progression of the regeneration of the hepatocytes following necrosis.

4803 IMMUNOLOGY OF CHRONIC LIVER DISEASES. (Ger.) Berg, P. A. (Medizinische Universitatsklinik, Otfried-Muller-Strasse, 7400 Tubingen, W. Germany). *Therapiewoche* 27(38):6551-6567, *passim*; 1977.

Studies on the immunological aspects of chronic liver diseases are reviewed. The destruction of hepatocytes seen in hepatitis B surface antigen (HBsAg)-positive and -negative acute and chronic hepatitis can be assumed to be primarily due to immune reactions. While T-cell-mediated cytotoxicity may play a dominant role in the acute stage of these diseases, the chronic inflammation is sustained by mechanisms involving antibodies, lymphokines, and perhaps immune complexes, thereby leading to the activation of unspecific inflammatory cells (antibody-mediated cytotoxic reactions). The target antigens are probably virus-associated antigens against the hepatocyte membrane, and the organ-specific membrane lipoprotein antigen (LSP antigen). The presence of organ-specific autoantibodies to liver-specific membrane lipoprotein in HBsAg-negative hepatitis; the absence of specific antiviral antibodies in various forms of autoimmune hepatitis, such as lupoid hepatitis, cholestatic chronic aggressive hepatitis, and primary biliary cirrhosis; and the predominance of HLA-B8 and HLA-B12 antigens in HBsAg-negative chronic active hepatitis indicate that hepatitis A or B virus infection is not likely to play any causative role in these diseases, i.e., autoimmune hepatitis is etiologically different from HBsAg-positive hepatitis. The causes of the chronic course are unknown. Disturbance in immune regulation in autoimmune hepatitis, possibly as a consequence of suppressor cell defect, seems likely. An additional stimulation by an autoantigen that has escaped tolerance may also play a role along with genetic factors. The steady activation of the immune system can be assumed to be due to noneliminated, virus-associated antigens in HBsAg-positive hepatitis. In these cases, there may be an impairment in antigen elimination, which may also be explained by a genetic defect. Immunosuppressive therapy is indicated in autoimmune hepatitis, except for primary biliary cirrhosis, but it is of doubtful value in HBsAg-positive hepatitis.

4804 IMMUNOLOGICAL ABNORMALITIES ASSOCIATED WITH LIVER DISEASE: CAUSE OR EFFECT? (Eng.) Smith, C. I.; Cooksley, W. G. E.; Powell, L. W. (Royal Brisbane Hosp., Herston Rd., Brisbane, Queensland 4029, Australia). *Aust. N.Z. J. Med.* 7(6):604-612; 1977.

The literature concerning immunological abnormalities associated with liver disease is reviewed. Liver damage with which these abnormalities may occur may be (a) nonspecific and unrelated to pathogenesis, e.g., caused by auto-antibodies such as antinuclear factor; (b) specifically directed against liver antigens but not pathogenetic, e.g., cell-mediated immune (CMI) reactions to liver antigen as seen in experimental carbon tetrachloride poisoning; (c) of such a nature as to modify the pathology produced by hepatotoxic agents, e.g., caused by hepatitis B virus or alcohol; or (d) primarily responsible for hepatic pathology, e.g., idiopathic chronic active hepatitis. The latter two possibilities remain unproven, although there is growing evidence that immune responses do play some role in the pathogenesis of acute and chronic hepatitis B and possibly also in the pathogenesis of alcoholic liver disease. It seems much less likely that primary abnormalities of the immune systems are responsible for any type of liver disease. The available evidence suggests that immune reactions could develop as a consequence of liver damage, and only in certain circumstances do these reactions play a role in the development and continuation of hepatic pathology.

4805 DEVELOPMENT, VALIDATION, AND APPLICATION OF A SINGLE-TUBE RADIOIMMUNOASSAY FOR CHOLIC AND CHENODEOXYCHOLIC CONJUGATED BILE ACIDS IN HUMAN SERUM. (Eng.) Roda, A.; Roda, E.; Aldini, R.; Festi, D.; Mazzella, G.; Sama, C.; *et al.* (S. Orsola Hosp., Via Massarenti, 9, 40138 Bologna, Italy). *Clin. Chem.* 23(11):2107-2113; 1977.

The development, validation, and application of a single-tube radioimmunoassay for both cholic acid and chenodeoxycholic acid conjugates in serum are described. The method is based on the use of [1-^{14}C]glycocholic acid and [U-^{3}H]glycochenodeoxycholic acid as tracers. The assay was shown to be specific, sensitive, accurate, and precise when used for serum samples from 20 control subjects and 40 patients with increased bile acid in the serum because of liver disease, and the results correlated well with those by gas chromatography ($r=0.99$).

4806 BILE SALT METABOLISM. II. BILE SALTS AND DISEASE. (Eng.) Campbell, C. B.; Cowen, A. E. (Christchurch Clinical Sch., Christchurch, New Zealand). *Aust. N.Z. J. Med.* 7(6): 587-595; 1977.

Present knowledge of bile salt metabolism in disease is reviewed, and its clinical importance is discussed. Liver damage results in elevated serum bile salt concentrations, which may be useful as a sensitive index of hepatocellular disease. Changes in the relative proportions of the individual bile salts in serum occur with cholestasis. Urinary excretion of bile salts, largely in the form of sulfates, increases as a compensatory mechanism. Ileal disease or resection causes bile salt malabsorption. The increase in colonic bile salts produces watery diarrhea, while the decrease in duodenal levels may cause steatorrhea. Cholelithiasis may result from alteration in the relative proportions of cholesterol, lecithin, and bile salts in bile. The mechanism apparently differs in various conditions predisposing to gallstone formation. A primary alteration of bile salt metabolism has been postulated in several other conditions. Considerable interest centers on the importance of metabolites of bile salts in the pathogenesis of colonic carcinoma. Chenodeoxycholic acid is a successful, although costly treatment for selected patients with cholesterol gallstones. Bile salt binding agents, such as cholestyramine, are extremely useful especially in the control of pruritus in patients with cholestasis.

4807 DETERMINATION OF PERIPHERAL BLOOD LEUKOCYTE ALKALINE PHOSPHATASE AND PEROXIDASE IN PATIENTS WITH LESIONS OF THE LIVER AND BILIARY TRACT. (Rus.) Podil'chak, L. M. (Medical Inst., Lvov, USSR). *Vrach. Delo* (9):96-98; 1977.

The diagnostic value of neutrophil alkaline phosphatase (AP) and peroxidase (PO) determinations was studied in 84 patients with infectious hepatitis and bile duct lesions. The highest AP activity was detected in patients with acute destructive cholecystitis, 230.0% compared to 197.3% in patients with cancer of the pancreas head, 180.3% in patients with cholelithiasis complicated by obstructive jaundice, 46.1% in patients with chronic cholecystitis, 21.3% in patients with infectious hepatitis, and 35.1% in healthy controls. The activity of PO was increased only in the patients with infectious hepatitis and destructive cholecystitis.

4808 RED BLOOD CELL TRANSKETOLASE ACTIVITY AND THE EFFECT OF THIAMINE SUPPLEMENTATION IN PATIENTS WITH CHRONIC LIVER DISEASE. (Eng.) Rossouw, J. E.; Labadarios, D.; Krasner, N.; Davis, M.; Williams, R. (Natl. Res. Inst. Nutritional Diseases, Tygerberg, South Africa). *Scand. J. Gastroenterol.* 13(2):133-138; 1978.

Thiamine nutrition was assessed in 17 patients with alcoholic cirrhosis and 14 patients with nonalcoholic chronic liver disease, and the effect of thiamine supplementation was investigated. Biochemical evidence of thiamine deficiency was found in 58% of patients with chronic liver disease, the incidence being higher in alcoholic than in nonalcoholic patients (70.6% versus 42.8%, $p<0.05$). Supplementation with high doses of thiamine hydrochloride (200 mg/day) for 1 week restored levels of thiamine pyrophosphate (TPP), the active coenzyme form of thiamine, to normal in all cases. Such supplementation also stimulated synthesis of the TPP-dependent enzyme, transketolase. Because of the essential role of TPP as a cofactor in intermediary metabolism, it is concluded that high doses of thiamine should be included in the routine nutritional management of patients with severe chronic liver disease.

4809 RATIO OF URINARY 6β-HYDROXYCORTISOL TO 17-HYDROXYCORTICOSTEROIDS IN PATIENTS WITH LIVER DISEASE. (Eng.) Eade, O. E.; Maddison, A.; Leonard, P. J.; Wright, R. (Southampton Univ. Hosp., Tremona Rd., Southampton SO9 4XY, England). *Digestion* 16(1/2):169-174; 1977.

To evaluate the extent to which microsomal enzyme induction in liver diseases could be demonstrated using the ratio of 6β-hydroxycortisol to 17-hydroxycorticosteroids in the urine, this ratio was measured in 73 patients with liver disease and in 53 controls. The mean ratio was significantly greater in the patients with liver disease than in the controls (60 ± 5.5 versus 19 ± 2.4, $p<0.001$). This elevation was most marked among patients with liver metastases (85 ± 24.6, $p<0.05$) and patients with acute hepatitis. The use of this ratio as a test of early liver cell dysfunction requires further evaluation.

4810 THE PLASMA LEVELS OF 25-HYDROXYVITAMIN D IN PATIENTS WITH VARIOUS LIVER DISEASES AND THE RESPONSE OF 25-HYDROXYVITAMIN D TO VITAMIN D TREATMENT. (Eng.) Seino, Y.; Shimotsuji, T.; Kai, H.; Ikehara, C.; Yabuuchi, H. (Osaka Univ. Medical Sch., 1-1-50, Fukushima Fukushima-ku, Osaka, Japan 553). *Acta Paediatr. Scand.* 67(1):39-42; 1978.

The mean plasma levels of 25-hydroxy-vitamin D (25-OH-D) were measured before and after the administration of 2,000 U of daily p.o. vitamin D_2 for a period of 2 weeks in nine normal infants and children, seven infants with neonatal hepatitis and persistent neonatal hepatitis, and four infants with congenital biliary atresia. The mean plasma level of 25-OH-D increased significantly from 19.5 ± 3.7 ng/ml 34.0 ± 6.8 ng/ml in controls ($p<0.05$) after vitamin D_2 administration. The mean plasma level of 25-OH-D also increased from 8.0 ± 2.1 ng/ml to 22.1 ± 2.6 ng/ml after vitamin D treatment in the hepatitis group ($p<0.05$). In patients with congenital biliary atresia, vitamin D treatment did not affect the 25-OH-D plasma levels. The results suggest that patients with neonatal hepatitis should be maintained on supplemental vitamin D uptake with adjustments to individual requirements.

4811 PANCREATIC HYPERSECRETION IN LIVER DISEASE. (Eng.) Gregg, J. A.; Sharma, M. M. (110 Francis St., Boston, MA 02215). *Am. J. Dig. Dis.* 23(1):9-11; 1978.

To determine whether the liver or the pancreas is involved in the production of abnormally large duodenal aspirates observed in many patients with liver cirrhosis, 11 cirrhotic patients and 1 patient with cholestatic hepatitis underwent an intraductal secretin test during endoscopic cannulation of the pancreatic duct. Six patients with cirrhosis had pancreatic hypersecretion ranging from 7.8 to 26.0 ml/min, while three patients demonstrated low secretory flow rates. Bile flow was negligible or nonexistent in 10 patients, while in 2 others, larger but unmeasurable amounts of bile secretion were present. This study conclusively demonstrates that pancreatic hypersecretion may occur in patients with cirrhosis during secretin stimulation. Impaired secretin metabolism or the associated pancreatic hypersecretion of early pancreatitis may be responsible for this finding.

4812 LIVER DISEASE IN RENAL TRANSPLANT RECIPIENTS. (Eng.) Sopko, J.; Anuras, S. (Univ. Iowa Hosp. and Clinics, Iowa City, IA 52242). *Am. J. Med.* 64(1):139-146; 1978.

Information concerning liver disease as a complication of renal transplantation is reviewed. Liver disease is a common complication in renal transplant recipients. The most common liver diseases are acute and chronic hepatitis. The varieties of acute hepatitis include hepatitis A, hepatitis B, cytomegalovirus hepatitis, herpes simplex hepatitis, and azathioprine hepatitis. The incidence of azathioprine hepatitis may not be as high as initially suggested. Chronic hepatitis is a serious problem because the disease seems to be progressive despite prednisone therapy. The causes of this chronic hepatitis are not fully known, although hepatitis B, cytomegalovirus, and herpes simplex virus have been implicated. Discontinuation of azathioprine therapy has no appreciable effect on the course of chronic hepatitis.

4813 ULTRASTRUCTURE OF THE LIVER IN A CASE OF CHILDHOOD CYSTINOSIS. (Eng.) Scotto, J. M.; Stralin, H. G. (Hopital d'Enfants, F-94270 Le Kremlin-Bicetre, France). *Virchows Arch. [Pathol. Anat.]* 377(1):43-48; 1977.

The liver was studied ultrastructurally in a case of childhood cystinosis. Crystalline structures were found mainly in Kupffer cells. The presence of dark cells, with or without crystals, was the most striking feature observed. Identical dark material was also found extracellularly. These data show that free cystine can fill cell cytoplasm and extracellular spaces, and the possibility that cystine overproduction may take place in the hyaloplasm should be considered. The extracellular location of cystine in the tubules might account for an increase in epithelial permeability.

4814 ABNORMAL SIALIC ACID CONTENT OF THE DYSFIBRINOGENEMIA ASSOCIATED WITH LIVER DISEASE. (Eng.) Martinez, J.; Palascak, J. E.; Kwasniak, D. (Jefferson Medical Coll.-Thomas Jefferson Univ., Philadelphia, PA 19107). *J. Clin. Invest.* 61(2):535-538; 1978.

To evaluate the possibility that the carbohydrate composition of fibrinogen may be altered in the dysfibrinogenemia associated with liver disease, the sialic acid content of purified fibrinogen from 12 patients with liver disease and its relation to the prolongation of the thrombin time were studied. Purified fibrinogen showed intact Aα-, Bβ-, and γ-chains when reduced and analyzed by sodium dodecyl sulfate-polyacrylamide gel electrophoresis and exhibited prolongation of the thrombin time similar to that of the plasma from which it was derived. Sialic acid content of the purified fibrinogen ranged from 12.7% to 71.4% higher in patient fibrinogens when compared to those of normal controls. A progressive delay in thrombin time was associated with increasing sialic acid content of the patient fibrinogen. Enzymatic removal of sialic acid from four of the abnormal fibrinogens resulted in a shortening of their thrombin times to the range of the desialylated normal control. PAS reagent stained only the Bβ- and γ-chains of the reduced patient fibrinogens after sodium dodecyl sulfate-polyacrylamide gel electrophoresis, suggesting that the excess sialic acid is located on these two chains. These studies demonstrate a biochemical alteration of the functionally abnormal fibrinogen found in some patients with liver disease, and indicate that the excess sialic acid plays an important role in the functional defect of this protein.

4815 FAMILIAL SYNDROME OF PROGRESSIVE CONE DYSTROPHY, DEGENERATIVE LIVER DISEASE AND ENDOCRINE DYSFUNCTION. II. CLINICAL AND METABOLIC STUDIES.

(Eng.) Larsen, I. F.; Hansen, E.; Berg, K. (Univ. Hosp., Rikshospitalet, Oslo, Norway). *Clin. Genet.* 13(2):176-189; 1978.

Six female patients from two sibships in a family with a high degree of consanguinity and a male patient from another family, all of whom have a new syndrome of total color blindness (progressive cone dystrophy), liver degeneration, and endocrine dysfunction, are described. The patients showed endocrine defects at different levels of regulation. None of the patients had children; two were probably infertile and three had had repeated spontaneous abortions. Two patients had primary hypothyroidism and two others had low normal thyroid function with protracted thyrotropin-releasing hormone (TRH) test response, indicating a hypothalamic disorder. A defect in the ACTH reserve, as tested by Metyrapone®, was found in two patients. Diabetes mellitus of the "maturity-onset type diabetes of the young" was observed in three patients, and a fourth had a borderline glucose tolerance with further impairment during pregnancy. Hypertension was observed in the diabetic patients. Diabetes was seldom present among the relatives, but hypertension occurred frequently. Four patients had liver degeneration, demonstrated by elevated levels of transaminases and unspecific parenchymal degeneration, fatty infiltration, and isolated liver cell necrosis in the biopsy. All patients, except the youngest (age 12 yr), had progressive hearing loss, classified in four cases as neurogenous and probably cochlear. In the boy (age 17 yr), the hearing loss was a neurogenous congenital hypacusis. There were several cases of hearing defects among the relatives, so it is difficult to relate this to the syndrome. Enlarged sella turcica were found in three patients and in one of these an "empty sella" was demonstrated by surgery. Elevated creatine phosphokinase was also observed. All the different lesions suggest a systemic disorder, possibly a membrane defect.

4816 FAMILIAL SYNDROME OF PROGRESSIVE CONE DYSTROPHY, DEGENERATIVE LIVER DISEASE, AND ENDOCRINE DYSFUNCTION. III. GENETIC STUDIES.

(Eng.) Berg, K.; Larsen, I. F.; Hansen, E. (Inst. Medical Genetics, Univ. Oslo, Blindern, Oslo 3, Norway). *Clin. Genet.* 13(2):190-200; 1978.

A syndrome of progressive cone dystrophy, endocrine dysfunction, and degenerative liver disease is described in seven patients, six of whom belonged to one extensive kindred. Liver disease, an unspecific toxic pattern, with degenerative changes and fatty infiltration, was demonstrated in all four patients subjected to liver biopsy. However, liver function was satisfactory in all patients. Genetic analyses revealed a segregation ratio indicating autosomal recessive inheritance of the syndrome, and the kindred from which six of the seven patients originated was heavily inbred. Thus, the results of the segregation analyses as well as of the inbreeding analyses provide evidence that this previously unrecognized disorder is inherited as an autosomal recessive trait. Genetic marker analyses were conducted with respect to 22 marker systems, and linkage information was obtained with respect to 15 of them. No strong suggestion of linkage emerged from the analyses, but very close linkage could be excluded for several of the genetic marker systems. Pedigree analysis was helpful in establishing the spectrum of clinical manifestations belonging to the syndrome proper. The data suggest that elevated levels of creatine phosphokinase, which were found in all patients, may be useful in tracing heterozygotes for this disorder.

4817 PSEUDO-BUDD-CHIARI SYNDROME.

(Eng.) Dhawan, V. M.; Sziklas, J. J.; Spencer, R. P. (Univ. Connecticut Health Center, Farmington, CT 06032). *Clin. Nucl. Med.* 3(1):30-31; 1978.

The case of a 67-yr-old man with clinical, laboratory, radiographic, and scintigraphic findings resembling the Budd-Chiari syndrome is described. However, at autopsy there was no thrombotic occlusion of any of the intrahepatic veins. The right hepatic vein was completely constricted by the hypertrophied left lobe of the liver, and the left hepatic vein was narrowed. The authors have referred to this clinical entity as the pseudo-Budd-Chiari syndrome. It represents a potentially treatable form of the Budd-Chiari syndrome.

4818 DETECTION OF HEPATOCELLULAR CARCINOMA DURING A CLINICAL FOLLOW-UP OF CHRONIC LIVER DISEASE: OBSERVATIONS IN 31 PATIENTS.

(Eng.) Kubo, Y.; Okuda, K.; Musha, H.; Nakashima, T. (Kurume Univ. Sch. Medicine, Kurume, Japan). *Gastroenterology* 74(3):578-582; 1978.

Clinical and pathological findings are presented for 31 patients with an initial diagnosis of cirrhosis or chronic hepatitis in whom hepatocellular carcinoma (HCC) was detected after a clinical follow-up of 8 months to 14 yr (average 59 months). They had had no scintigraphic and biochemical abnormalities suggestive of HCC at the beginning of the follow-up period. The follow-up period before the detection of carcinoma was shorter in patients positive for hepatitis B surface antigen (HBsAg) compared with those negative for HBsAg. Analyses of clinical data during the follow-up and liver scans made shortly before tumor detection suggested that in most of these patients HCC became discernible relatively early in the course of cirrhosis or long before cirrhosis reached an advanced stage. A sharp rise in serum α-fetoprotein level proved highly diagnostic in 11, it remained low throughout in 7, and tumor was already unresectable in the majority. Although continuous and regular check for α-fetoprotein is imperative in patients with chronic liver disease, particularly in those with hepatitis B surface antigenemia, additional diagnostic tools are necessary for the detection of small HCC in its resectable stage.

4819 INCIDENCE IN SOUTH-WEST SCOTLAND OF HEPATITIS B SURFACE ANTIGEN IN THE LIVER OF PATIENTS WITH HEPATOCELLULAR CARCINOMA. (Eng.) Turbitt, M. L.; Patrick, R. S.; Goudie, R. B.; Buchanan, W. M. (Glasgow Royal Infirmary, Glasgow, Scotland). *J. Clin. Pathol.* 30(12):1124-1128; 1977.

To examine the possible relationship between hepatitis B surface antigenemia and the occurrence of primary hepatocellular carcinoma, the incidence of hepatitis B surface antigenemia was determined in the livers of 81 patients with PHC, 82 patients with cirrhosis, and 112 controls in Southwest Scotland. A retrospective examination of formalin-fixed paraffin-embedded liver tissue by an immunoperoxidase technique revealed hepatitis B surface antigen (HBsAg) in eight cases of PHC and in four cases of cirrhosis. No positive staining was found in the 112 controls without overt liver disease matched for age and sex. Unlike most previous studies showing an association between HBsAg and PHC, the present investigation was carried out in an area where HBs antigenemia is infrequent and PHC is an uncommon tumor. While hepatitis infection is possibly an important cause of PHC, the association between HBsAg and PHC could be due merely to activation by the tumor of latent virus B in a previously infected person.

4820 PRIMARY LIVER TUMORS AND ORAL CONTRACEPTIVES: RESULTS OF A SURVEY. (Eng.) Vana, J.; Murphy, G. P.; Aronoff, B. L.; Baker, H. W. (Roswell Park Memorial Inst., 666 Elm St., Buffalo, NY 14263). *JAMA* 238(20):2154-2158; 1977.

Data on cases of primary liver tumors (378 women, 165 men) reported by 477 hospitals in the United States during 1970 to 1975 were reviewed to define the relation between primary liver tumors and oral contraceptives. In men, 91.5% of the tumors were malignant, whereas in women, only 43.9% were malignant. Of the 212 benign tumors in women, 96 were hepatic cell adenomas and 58 were focal nodular hyperplasias. A history of oral contraceptive use was found in nearly half of all women: 65% with benign tumors, 74% with hepatic cell adenomas, and 74% with focal nodular hyperplasias. Symptoms were more severe among contraceptive users. No case of bleeding was observed in nonusers. The findings confirm the suggested association between oral contraceptive use and hepatic cell adenomas and focal nodular hyperplasias.

4821 HEPATIC LOCALIZATION OF MALIGNANT SCHWANNOMA (Fre.) Heully, F.; Gaucher, P.; Pointel, J. P.; Bigard, M. A.; Bach, D.; Rauber, G.; *et al.* (Clinique Gastro-Enterologique, Nancy, France). *Ann. Med. Nancy* 15:1153-1162; 1976.

A case of malignant hepatic schwannoma is reported in a 50-yr-old woman who had a mediastinal neurofibrosarcoma surgically removed 9 yr previously. There was no evidence of cutaneous neurofibromatosis or of a recurrence of the mediastinal tumor. A laparotomy revealed a voluminous inoperable hepatic tumor. Light and electron microscopy of biopsies confirmed a malignant neurofibromatous tumor with atypical proliferating functional cells. A review of the literature shows only 13 cases of hepatic schwannomas; these cases are summarized in tabular form. The diagnosis can only be confirmed by endoscopic biopsy, even though this procedure often accelerates tumor evolution. Treatment is essentially surgical, possibly with postoperative radiotherapy.

4822 HEPATIC DYSFUNCTION DURING HYPERALIMENTATION. (Eng.) Sheldon, G. F.; Petersen, S. R.; Sanders, R. (San Francisco General Hosp., San Francisco, CA 94110). *Arch. Surg.* 113 (3):504-508; 1978.

Liver biopsy specimens were studied in 26 patients in whom liver function abnormalities developed during i.v. hyperalimentation (IVH). The clinical manifestations and duration of IVH were evaluated in relation to the morphological changes seen in the liver. Early hepatic changes consisted of fatty metamorphosis, present in eight of nine patients whose liver biopsy specimens were obtained within 5 days. In two patients, evidence of intrahepatic cholestasis developed after 5 days of IVH. Biopsy specimens examined after 10 days of the IVH regimen in four of seven patients showed lesser degrees of fatty infiltration than in patients receiving IVH for shorter intervals. Bile duct proliferation, bile plugs within canaliculi, centrilobular cholestasis, and pigment accumulation within hepatocytes were observed after 21 days of IVH. Specimens from patients who had received IVH for over 3 weeks showed periportal inflammation and persistent intrahepatic cholestasis. The authors propose that essential fatty acid deficiency, amino acid imbalance, caloric excess, and toxic manifestations of certain amino acids may be causative factors of these phenomena. Hepatic steatosis secondary to IVH may be treated by lowering the dextrose concentration of the infusion or by administering dextrose-free amino acid solutions. The clinical importance of this common complication of IVH is the difficulty in distinguishing it from other causes of cholestasis in seriously ill patients.

4823 CLINICAL AND MORPHOLOGICAL FINDINGS IN RECURRENT INTRAHEPATIC CHOLESTASIS IN CHILDHOOD AND ITS DIFFERENTIAL DIAGNOSIS. (Ger.) Gathmann, A. H.; Tulusan, A. H.; Osswald, P. (Pathologisches Institut der Universitat, Krankenhausstrasse 8-10, 8520 Erlangen, W. Germany). *Therapiewoche* 27(39):6730-6732; 1977.

The clinical and morphological aspects of recurrent intrahepatic cholestasis were studied in two children aged 3 and 4.5 yr. Pruritus and symptoms suggestive of mechanical obstructive jaundice were the first symptoms in both cases, whereas the intrahepatic and extrahepatic bile ducts were intact. Numerous giant cells of reactive origin were found in a liver biopsy specimen from one patient. Bile pigment was seen mostly in the greatly dilated canaliculi. Pathogenetically, the increase of bile acids, followed by the accumulation of bilirubin-bile acid complexes in the canaliculi, as well as the partial interruption of the enterohepatic circulation, are important factors.

4824 REPORT OF A CASE OF BENIGN RECURRENT INTRAHEPATIC CHOLESTASIS (TYGSTRUP-SUMMERSKILL AND WALSHE SYNDROME).

(Ger.) Schmeisser, W.; Eggstein, M.; Maulbetsch, R.; Dolle, W. (Abteilung I Innere Medizin, Medizinische Universitatsklinik, Tubingen, W. Germany). *Schweiz. Med. Wochenschr.* 107(45):1613-1620; 1977.

A typical case of benign recurrent intrahepatic cholestasis in a 22-yr-old man is reported. and 65 cases known from the literature are reviewed. The patient, who had nine attacks of pruritus and jaundice, was 10 yr old at the time of the first attack. Some of the attacks were typically triggered by infections. Nausea, emesis, diarrhea, dark brown urine, increased alkaline phosphatase level, and slightly increased transaminase levels with bilirubinemia were the characteristic symptoms. The intrahepatic and extrahepatic bile ducts were intact. The serum gamma-glutamyltranspeptidase activity was nearly normal. Nonspecific mesenchymal reaction of the liver was seen during the asymptomatic periods. The analysis of the literature shows that most patients had their first jaundice attack before puberty, which is then followed by up to 27 attacks with durations of 2 week to 60 months. The length of the asymptomatic intervals was 2 months to 20 yr.

4825 INTRAHEPATIC CHOLESTASIS OF PREGNANCY. A STUDY BASED ON 59 CASES.

(Fre.) Creze, B.; Creze, J.; Joubaud, F.; Denis, A.; Rouchy, R. (Service de Clinique Obstetricale et Gynecologique, CHU, 49036 Angers Cedex, France). *Rev. Franc. Gynecol. Obstet.* 71(5):317-328; 1976.

Hepatogestosis or idiopathic intrahepatic cholestasis of pregnancy (IICP) was studied in 59 cases. IICP occurred during the third trimester of pregnancy and was associated with pruritus in 28 women and with pruritus and icterus in 31. The levels of alkaline phosphatase and lactic dehydrogenase (LDH) were significantly elevated in all cases tested. SGOT and SGPT were more elevated in women with icterus than in those with simple pruritus (200 U versus 143 U and 214 U versus 126 U, resp.). Biopsy showed local, centrilobular cholestasis, and electron microscopy demonstrated alterations of biliary pole villi of hepatocytes. There was no necrosis or inflammatory process. Amniotic fluid was often discolored and/or contained meconium. Although the women recovered promptly after parturition, the fetal prognosis was adversely affected, mainly because of premature births (41/59 cases). The high instance of prematurity may be ascribed to the high level of bile salts in these women (27 mg/l versus 0.87 mg/l during normal pregnancy). There were also five deaths *in utero*. Since there was no correlation between the severity of the disease in the mother and its effect on the fetus, and since the efficacy of treatment with neurosedatives, antihistamines, and bile acid chelators was inconsistent, a very strict surveillance of women with these high risk pregnancies is recommended as the best method to reduce fetal mortality and morbidity.

4826 PATHOPHYSIOLOGY OF HYPOTENSION IN PATIENTS WITH FULMINANT HEPATIC FAILURE.

(Eng.) Trewby, P. N.; Williams, R. (King's Coll. Hosp. and Medical Sch., London, England). *Gut* 18(12):1021-1026; 1977.

The incidence and pathophysiology of hypotension was studied in 94 patients with fulminant hepatic failure. Eighty-two patients developed arterial hypotension with a systolic blood pressure of less than 80 mm Hg. Such episodes accounted for 16% of the total time spent in grade IV coma. Factors such as hemorrhage, cardiac or respiratory abnormalities, extracorporeal perfusion, or hypotension that occurred during the terminal stages of the illness could be implicated for only 40% of this time, leaving 60% as unexplained. Further investigation of these unexplained factors showed that peripheral vasodilatation rather than primary heart failure was responsible, and in all but three patients the construction of ventricular function curves showed a normal ventricular response to volume expansion with a corresponding increase in blood pressure. A small, but significant ($p<0.001$), slowing of the heart rate occurred during these periods of unexplained hypotension. This slowing, together with the association that was found between the occurrence of hypotension and cerebral edema with coning ($p<0.02$), suggests that central vasomotor depression may be important in the pathogenesis of the unexplained hypotension.

4827 SERUM OCTOPAMINE, COMA, AND CHARCOAL HAEMOPERFUSION IN FULMINANT HEPATIC FAILURE.

(Eng.) Chase, R. A.; Trewby, P. N.; Davis, M.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, SE5 England). *Eur. J. Clin. Invest.* 7(5):351-354; 1977.

Serum and urinary octopamine levels were studied in 20 patients with fulminant hepatic failure (FHF), and the possible influence of renal insufficiency in the alteration of these levels in FHF was investigated. Serum octopamine levels were significantly higher in the patients with FHF during the first

48 hr of grade IV coma than in healthy controls (3.38 ± 0.20 ng/ml and 1.75 ± 0.19 ng/ml, resp., $p<0.001$). Serial measurements in five patients who died without regaining consciousness showed serum octopamine to remain raised (3.36 ± 0.13 ng/ml), and concentrations in the cerebrospinal fluid at death (3.18 ± 0.32 ng/ml) reflected serum levels. In five patients who regained consciousness, improvement in encephalopathy was associated with a significant reduction in serum octopamine. Renal failure in patients with FHF was found to contribute to raised serum octopamine but could not alone account for the observed levels. Patients given neomycin therapy did not have significantly lower serum octopamine levels than an untreated group. There was, however, a significant correlation ($p<0.002$) between elevated serum octopamine and the occurrence of gastrointestinal bleeding during the previous 24 hr. Charcoal hemoperfusion did not appreciably reduce serum octopamine levels.

4828 PLATELET FUNCTION IN FULMINANT HEPATIC FAILURE AND EFFECT OF CHARCOAL HAEMOPERFUSION.

(Eng.) Weston, M. J.; Langley, P. G.; Rubin, M. H.; Hanid, M. A.; Mellon, P.; Williams, R. (King's Coll. Hosp. and Medical Sch., Denmark Hill, London, England). *Gut* 18(11):897-902; 1977.

Platelet function was studied in 34 patients with fulminant hepatic failure, and the effects of charcoal hemoperfusion were evaluated. In addition to being reduced in number in comparison with those in controls (157.1 ± 91.5 x 10^9/l versus 255.3 ± 84.4 x 10^9/l in controls, $p<0.005$), the platelets were also smaller (mean median volumes of 5.91 ± 0.99 fl and 6.6 ± 0.69 fl in patients and controls, resp., $p<0.005$). In keeping with these findings, capillary bleeding times were significantly longer in the patients compared with the controls (17.7 ± 9.6 min and 6.96 ± 1.6 min, resp., $p<0.001$) than could be accounted for by reduction in platelet numbers alone. In 19 patients who underwent hemoperfusion for temporary liver support, the capillary bleeding time was doubled, despite only a small drop in arterial platelet counts. This disproportionate prolongation of bleeding time was almost certainly caused by the loss of larger platelets in the charcoal columns during perfusion, as the mean median volume also fell during perfusion. Rises in screen filtration pressure of the blood leaving the columns were found during some perfusions and thought to be indicative of platelet aggregates. Release of vasoactive substances from platelets could account for the hypotension often found at this time.

4829 TREATMENT OF IRON OVERLOAD IN ADULTS WITH CONTINUOUS PARENTERAL DESFERRIOXAMINE.

(Eng.) Cooper, B.; Bunn, H. F.; Propper, R. D.; Nathan, D. G.; Rosenthal, D. S.; Moloney, W. C. (Peter Bent Brigham Hosp., 721 Huntington Ave., Boston, MA 02115). *Am. J. Med.* 63(6):958-966; 1977.

Five adult patients with transfusional hemosiderosis were given ascorbic acid (500 mg/day, p.o.) and treated with the iron chelator, desferrioxamine B (0.75-2.25 g/day). The drug was administered by continuous s.c. or i.v. infusions using a lightweight portable constant infusion device. On this regimen, four of the five patients were able to excrete significant amounts of iron (>35 mg/day) when receiving a daily desferrioxamine dose of 1.5 to 2.2 g. Continuous s.c. infusion was well tolerated and about 80% as effective as i.v. therapy in chelating iron. The number of prior transfusions, the hepatic iron content, and the serum ferritin levels appear to be useful in predicting which patients will respond to iron chelation therapy, especially if there is little bone marrow erythropoietic activity. One patient with ineffective erythropoiesis did not have significantly increased hepatic iron stores but responded to the administration of desferrioxamine. Continuous s.c. administration of desferrioxamine may prove to be adaptable for long-term outpatient therapy, allowing patients with ongoing transfusion requirements to go into negative iron balance.

4830 VASCULAR ALTERATIONS IN FOCAL NODULAR HYPERPLASIA OF THE LIVER.

(Eng.) Travers, H.; D'Amato, N. A. (Naval Regional Medical Center, Portsmouth, VA 23708). *Milit. Med.* 143(2):96-101; 1978.

Vascular alterations were studied in 11 cases of focal nodular hyperplasia (FNH) of the liver and 2 cases of hepatic adenoma. Variable intimal and medial hyperplasia with fragmentation of elastic laminae occurred in both arteries and veins in FNH. These changes were not found in hepatic adenoma. From these cases and those reported in the literature, together with the results of studies of the arteriographic appearance of FNH and the recently reported association of the lesion with oral contraceptive use, it is concluded that FNH arises as an hepatic reaction to injury induced by local vascular abnormalities, conceivably exacerbated by the administration of oral contraceptives.

4831 INHERITANCE OF PORPHYRIA CUTANEA TARDA: ANALYSIS OF 14 CASES IN 5 FAMILIES.

(Eng.) Topi, G.; Gandolfo, L. D. (Dept. Experimental Dermatology, Istituto S. Maria e S. Gallicano, Via S. Gallicano 25, Rome, Italy). *Br. J. Dermatol.* 97(6):617-627; 1977.

In an effort to establish the existence of a hereditary form of porphyria cutanea tarda (PCT), PCT is described as a common feature in several members of one family, and clinical and chemical criteria for distinguishing PCT from porphyria variegata (PV) are presented. Fourteen patients from five families (2, 2, 2, 3, and 5 per family, resp.) were found among 200 patients with PCT; in the latter family, the inheritance of PCT appears bilateral. All patients showed a constant increase in serum porphyrin level, a urinary excretion of δ-aminolevulinic acid (δ ALA) in the normal range, a marked increase in urinary porphyrins (with a prevalence of 8- and 7-COOH porphyrins), a normal excretion of coproporphyrins and protoporphyrins, and normal values for porphyrin in the erythrocytes and for porphobilinogen in the urine. Thus, to distinguish PCT from PV, hepatic coproporphyria, or hepatoerythrocytic porphyria, determinations of total urinary porphyrins, the pattern of urinary porphyrins, fecal porphyrins (in patients with high porphyrin excretion and/or a prevalence of uroporphyrins or of 7-COOH porphyrins), δ ALA, and porphobilinogen must be carried out. This analysis should be extended to blood relatives, even in the absence of symptoms, to prove hereditary PCT. The metabolic defect appears to be inherited as an autosomal dominant trait and may have a low penetrance, mild expressivity, or require an exogeneous acquired factor (infective or toxic) capable of damaging the liver before the appearance of clinical manifestations.

4832 BANNED AND PERMITTED DRUGS IN ACUTE HEPATIC PORPHYRIA. (Ger.) Doss, M.; Wetterberg, L. (Fach Klinische Biochemie im FB Humanmedizin der Universitat, Pilgrimstein 2, D-3550 Marburg/Lahn, W. Germany). *Fortschr. Med.* 95(42):2531-2533; 2536; 1977.

The drugs that are permitted and banned in acute hepatic porphyria (acute intermittent porphyria, porphyria variegata, and hereditary coproporphyria) in various countries (Australia, Bulgaria, Denmark, Finland, France, Great Britain, Norway, Poland, South Africa, Sweden, Switzerland, United States, and West Germany) are listed. Chlorpromazine, penicillin, chloralhydrate, morphine, neostigmin, propranolol, ether, tetracycline, acetylsalicylic acid, atropine, guanethidine, laughing gas, succinyl dicholine, corticosteroids, rifamycin, dicoumarol, dexamethasone, droperidol, mefenamic acid, pethidine, phenatanyl, propoxyphene, and reserpine are each permitted in at least one country. Althesin, barbiturates, bemegrid, carbromal, chloramphenicol, chlorodiazepoxide, chloropropamide, diazepam, ergotamine preparations, fern extracts, gluthetimide, griseofulvin, halothane, hydantoin, imipramine, ketamines, meprobamate, mesuccimide, methyldopa, methypyrylone, nikethamide, estrogens, oral contraceptives, pentazocin, phensuximide, phenylbutazone, pyrazine amide, pyrazolone derivatives, steroids, sulfonamides, theophyllin derivatives, tolbutamide, troxidone, heavy metals, alcohol, and low-calorie diet are banned because of associated clinical manifestations. Acetylsalicylic acid, methadone, pethidine, morphine and its derivatives, chloralhydrate, paraldehyde, chloropromazine, reserpine, propranolol, valerian tincture, neostigmine, B vitamins, calcibromate, calcium gluconate, corticosteroids, and cytochrome C are permitted, while pyrazolone derivatives, phenylbutazone, barbiturates, glutethimide, methypyrylone, meprobamate, diazepine, sulfonamides, griseofulvin, chloramphenicol, tetracyclin, oral antidiabetics, anticoagulants, hydantoin, ergotamine, estrogens, progesterone, and oral contraceptives are banned in acute intermittent porphyria.

4833 CLINICAL, HUMORAL AND HISTOLOGICAL FINDINGS IN HEPATIC PORPHYRIA. (Ger.) Morl, M.; Hauenstein, K. H. (Medizinische Klinik und Poliklinik der Universitat, Krankenhausstr. 12, D-8250 Erlangen, W. Germany). *Munch. Med. Wochenschr.* 119(45):1457-1458; 1977.

The clinical, humoral, and histological findings in 25 patients with porphyria cutanea tarda (PCT) and in 4 patients with acute intermittent porphyria (AIP) are presented. The serum iron level was normal in all patients with AIP and the total lipid level was slightly increased at a normal triglyceride level in three of four patients. The total cholesterol level was increased in one case. Diabetic metabolism was found in two patients. Among the patients with PCT, fatty degeneration of the hepatocytes was seen in 17 cases, liver fibrosis in 4, liver cirrhosis in 5, chronic hepatitis in 4, epithelial cell and astrocyte siderosis in 13, and mesenchymal reaction in 19. The serum iron level was increased in two-thirds of the patients, the BSP test was pathological in 23/25, increased serum uric acid level was found in 11/25, increased total lipid level in 17/25, and 7/25 had manifest diabetes mellitus, while 4 others had subclinical diabetes mellitus.

4834 LARGE INTRAHEPATIC CYSTS AND PSEUDOCYSTS: PITFALLS IN DIAGNOSIS AND TREATMENT. (Eng.) Wellwood, J. M.; Madara, J. L.; Cady, B.; Haggitt, R. C. (St. Bartholomew's Hosp., West Smithfield, London, EC1, England). *Am. J. Surg.* 135(1): 54-64; 1978.

The records of 47 patients with large intrahepatic cysts or pseudocysts were analyzed, and the nature, diagnosis, and treatment of these cysts are described. Thirty-one cysts were developmental, and 16 were acquired. Patients with developmental cysts and those with neoplastic cysts had similar features, including an absence of constitutional illness, but patients with infective pseudocysts generally had features of systemic disease and often had hematologic abnormalities. Sonography indicated the cystic nature of the lesions, but operation was usually necessary to establish a precise diagnosis. Four of the solitary giant cysts were successfully treated by subtotal excision, a less extensive procedure than hepatic resection or total excision of the cyst. Recurrences were common after lesser procedures. The nature of two malignant cysts was not recognized at operation, and cysts with macroscopic features of neoplasia should be treated by hepatic resection even when frozen section biopsy fails to support such a diagnosis. Pyogenic pseudocysts were treated adequately by drainage, but echinococcal cysts required injection with hypertonic saline or Formalin and partial or complete excision for cure. Traumatic pseudocysts healed only when bleeding or bile leakage into the cyst cavity was controlled.

4835 HEPATIC FAILURE AND DEATH FROM ERYTHROPOIETIC PROTOPORPHYRIA. (Eng.) Singer, J. A.; Plaut, A. G.; Kaplan, M. M. (New England Medical Center Hosp., 171 Harrison Ave., Boston, MA 02111). *Gastroenterology* 74(3):588-591; 1978.

The case of a 60-yr-old white man presenting with a clinical picture of obstructive jaundice, who was subsequently found to have erythropoietic protoporphyria, is described. The diagnosis was suspected because of a history of life-long photosensitivity and was confirmed by finding high levels of RBC protoporphyrin. Liver biopsy revealed birefringent deposits of protoporphyrin by polarization microscopy accompanied by severe hepatic injury and fibrosis. The patient died rapidly from liver failure, and at autopsy the biliary tree was patent. Despite the autosomal dominant transmission of erythropoietic protoporphyria, no family members with the disease were found.

4836 THE PATTERN OF THE WHOLE BODY DISTRIBUTION OF RADIOACTIVE COPPER (^{67}Cu, ^{64}Cu) IN WILSON'S DISEASE AND VARIOUS CONTROL GROUPS.

(Eng.) Walshe, J. M.; Potter, G. (Cambridge Univ. Clinical Sch., Cambridge, England). *Q. J. Med.* 46 (184):445-462; 1977.

A new technique for studying the distribution and uptake of injected radioactive copper, using a whole-body monitor modified to act as a profile scanner, is described. ^{64}Cu and ^{67}Cu were injected i.v. and used to study abnormalities of copper transport in patients with Wilson's disease in the presymptomatic (8 patients), symptomatic (14), and treated phases (14) of the disease. The findings were compared with data obtained from 10 individuals heterozygous for the Wilson's disease gene and from a control group consisting of 13 patients of similar age with a variety of diseases of the motor nervous system. The measurements made included plasma levels of radioactive copper, liver uptake, and whole-body distribution measured both by profile scanning and whole-body scintiscanning. Results from the various techniques were in good agreement. They confirmed earlier findings that, in presymptomatic Wilson's disease, the uptake of copper by the liver is significantly greater than in controls, and rises continuously. Heterozygotes took up an intermediate position between the two groups. Disappearance of copper from plasma roughly corresponded to the sequestration of the metal by liver. Untreated, symptomatic Wilson's disease patients showed much delayed copper uptake by the liver and slow plasma clearance. Treatment with chelating agents restored the pattern towards that seen in presymptomatic patients. A feature of the profile scan and the scintiscans in the controls was the appearance of copper in the gut at or soon after 48 hr, a feature that has not been seen in heterozygotes and presymptomatic patients. The shape of the profile scan in the heterozygotes was more akin to that seen in presymptomatic Wilson's disease than in controls, and this observation increases the possibility of diagnosing the carrier state with greater precision than was previously possible.

4837 ATYPICAL MANIFESTATION OF WILSON'S DISEASE IN CHILDHOOD.

(Ger.) Feist, D.; Schmid-Ruter, E.; Wesch, H. (Universitats-Kinderklinik, Im Neuenheimer Feld 150, 6900 Heidelberg 1, W. Germany). *Therapiewoche* 27(39):6743-6746, *passim*; 1977.

The observation of atypical manifestations of Wilson's disease in four children (aged 9.9-15 yr) is reported. Jaundice, hematemesis, and hepatic coma were the first symptoms in two patients, recurrent epistaxis and hematemesis in one, and recurrent epistaxis and splenomegaly in another. Two patients died from hemorrhage, and the other two have been asymptomatic under D-penicillamine treatment for 2.5 and 4.5 yr, resp. Two patients were examined for Kayser-Fleischer rings, which were found in one of them. Wilson's disease was diagnosed on the basis of increased liver copper level (535-1,250 μg/g). The ceruloplasmin level, determined in two patients, was 10.9 mg% and 18.2 mg%, resp. The urine copper level was also increased following D-penicillamine treatment. The findings indicate that Wilson's disease should be considered in any acute or chronic hepatopathy of unknown genesis or atypical course, or in hepatomegaly, splenomegaly, and hemolytic crises in school-age children. Normal serum levels of ceruloplasmin and copper do not rule out Wilson's disease. The serum copper may even be increased during acute crises. The determination of the copper content in the 24-hr urine before and after 3-day treatment with D-penicillamine (0.9-1.2 g) and in liver biopsy specimens is necessary for the diagnosis of Wilson's disease with atypical manifestations.

4838 PROGNOSIS OF WILSON'S DISEASE IN CHILDHOOD.

(Eng.) Arima, M.; Takeshita, K.; Yoshino, K.; Kitahara, T.; Suzuki, Y. (Tottori Univ. Sch. Medicine, Yonago, Japan). *Eur. J. Pediatr.* 126(3):147-154; 1977.

The prognosis of Wilson's disease was studied in 49 children under the age of 15 with this disease. The patients were treated with D-penicillamine for 2 to 15 yr. None of the presymptomatic patients subsequently developed any symptoms of the disease. The results of treatment in the 13 patients who had exhibited only hepatic symptoms were also excellent. However, neurological manifestations associated with a history of jaundice or ascites in 26 patients responded less well to chelation. These observations clearly indicate that early diagnosis and treatment are extremely important to ensure normal lives for children with Wilson's disease.

4839 ABSOLUTE CONFIGURATION OF PENTAHYDROXY BILE ALCOHOLS EXCRETED BY PATIENTS WITH CEREBROTENDINOUS XANTHOMATOSIS: A CIRCULAR DICHROISM STUDY.

(Eng.) Dayal, B.; Salen, G.; Tint, G. S.; Toome, V.; Shefer, S.; Mosbach, E. H. (New Jersey Medical Sch., Newark, NJ 07103). *J. Lipid Res.* 19(2):187-190; 1978.

Circular dichroism (CD) spectroscopy was used to determine the absolute configurations of the C_{27} pentahydroxy bile alcohols present in bile and feces of two patients with cerebrotendinous xanthomatosis (CTX). The CD spectra of 5β-cholestane-3α,7α,12α,24α,25-pentol in the presence of $Eu(fod)_3$ (tris[1,1,1,2,2,3,3-heptafluoro-7,7-dimethyloctane-4,6-dionato] europium [III]) exhibited a negative Cotton effect and was assigned the 24*R* absolute configuration. Conversely, 5β-cholestane-3α,7α,12α,24β,25-pentol showed a strong positive Cotton effect and was assigned the 24*S* configuration. These assignments were based upon comparison with a model compound, 5-cholestene-3β,24(*R*),25-triol, whose single-crystal x-ray structure has been determined. The importance of these data is to establish a structural mechanism for the conversion of 5β-cholestane-3α,7α,12α,24*S*,25-pentol rather than 5β-cholestane-3α,7α,12α,24*R*,25-pentol into cholic acid in man as well as in animals.

4840 CHOLYL-L^{14}C GLYCINE CLEARANCE AND SERUM BILE ACID CONCENTRATION FOR THE DETECTION OF LIVER DYSFUNCTION [Abstract]. (Eng.) Thjodleifsson, B.; Barnes, S.; Chitranukroh, A.; Billing, B. H.; Sherlock, S. (Royal Free Hosp., Hampstead, London, England). *Digestion* 14(5/6):553-554; 1976.

4841 PROLYL HYDROXYLASE ACTIVITY IN LIVER BIOPSY SPECIMENS. AN INDICATOR FOR THE ACTIVITY OF CONNECTIVE TISSUE FORMATION [Abstract]? (Eng.) Brunner, G.; Schubothe, M. (Dept. Gastroenterology and Metabolic Diseases, Univ. Gottingen, Gottingen, W. Germany). *Digestion* 14(5/6):463; 1976.

4842 THE CORRELATION BETWEEN THE SPLEEN DELINEATION ON LIVER SCINTIGRAM AND LIVER FUNCTION TEST. (Eng.) Furukawa, M. (Kurume Univ. Sch. Medicine, Kurume 830, Japan). *Kurume Med. J.* 23(2):97-104; 1976.

4843 LIVER DISEASE IN EARLY LIFE IN KENYA. (Eng.) Bowry, T. S.; Cameron, H. M. (Dept. Pathology, Univ. Nairobi, Nairobi, Kenya). *Trans. R. Soc. Trop. Med. Hyg.* 70(5/6):439-443; 1976.

4844 CAN SEVERE CHRONIC ACTIVE LIVER DISEASE (CALD) TREATED WITH STEROIDS BE CURED [Abstract]? (Eng.) Czaja, A. J.; Summerskill, W. H. J. (Mayo Clinic, Rochester, MN). *Gastroenterology* 72(5, Part 2):1042; 1977.

4845 LIVER DISEASE IN INFANTS. PART I: DEVELOPMENTAL HEPATOLOGY AND MECHANISMS OF LIVER DYSFUNCTION. (Eng.) Andres, J. M.; Mathis, R. K.; Walker, W. A. (Massachusetts General Hosp., Boston, MA 02114). *J. Pediatr.* 90(5):686-697; 1977.

4846 DYNAMICS OF LIPID, CARBOHYDRATE, MAGNESIUM AND PROTEIN DISTURBANCES IN LIVER DISEASES. (Pol.) Skarbek-Galamon, C.; Durasiewicz, Z. (ul. Rewolucji 1905 r. 76 m 1. 90-223, Lodz, Poland). *Wiad. Lek.* 29(22):1985-1993; 1976.

4847 DISTRIBUTION PATTERNS OF PROCOLLAGEN I AND III IN LIVER DISEASE [Abstract]. (Eng.) Penner, E.; Brunner, H.; Wick, G. (Dept. Gastroenterology, Univ. Vienna, Vienna, Austria). *Gastroenterology* 72(5, Part 2):1112; 1977.

4848 VALUE OF DIALYSIS IN THE TREATMENT OF RENAL FAILURE IN PATIENTS WITH LIVER DISEASE [Abstract]. (Eng.) Weston, M. J.; Wilkinson, S. P.; Parsons, V.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6): 555; 1976.

4849 HYPERGLOBULINEMIA AND VIRAL ANTIBODIES IN LIVER DISEASE. (Eng.) Wright, R. (Royal South Hants Hosp., Southampton SO9 4PE, England). *Minerva Gastroenterol.* 22(3):181-183; 1976.

4850 HEPATIC CHOLESTEROL ESTER HYDROLASE IN HUMAN LIVER DISEASE [Abstract]. (Eng.) Simon, J. B.; Poon, R. W. M. (Dept. Medicine, Queen's Univ., Kingston, Ontario, Canada). *Clin. Res.* 24 (5):667A; 1976.

4851 THE DISEASE SPECIFICITY OF A LIVER-MEMBRANE AUTOANTIBODY [Abstract]. (Eng.) Tage-Jensen, U.; Arnold, W.; Dietrichson, O.; Hardt, F.; Hopf, U.; Meyer zum Buschenfelde, K. H.; Nielsen, J. O. (Kommunehospitalet, Copenhagen, Denmark). *Digestion* 14(5/6):553; 1976.

4852 AMOEBIC LIVER ABSCESS IN RHODESIAN AFRICANS. (Eng.) Lamont, A. C.; Wicks, A. C. B. (Harari Hosp., Salisbury, Rhodesia). *Trans. R. Soc. Trop. Med. Hyg.* 70(4):302-305; 1976.

4853 PHENOBARBITAL THERAPY IN INTRAHEPATIC AND EXTRAHEPATIC CHOLESTASIS IN ADULTS. A RANDOMIZED TRIAL [Abstract]. (Eng.) Metreau, J. M.; Lecompte, Y.; Arondel, J.; Dhumeaux, D. (Hopital Henri-Mondor, Creteil, France). *Digestion* 14(5/6): 471-472; 1976.

4854 ROLE OF RENAL TUBULAR REABSORPTION OF BILE ACIDS IN CHOLESTASIS [Abstract]. (Eng.) Barnes, S.; Gollan, J.; Billing, B. H. (Royal Free Hosp., Hampstead, London, England). *Digestion* 14(5/6):474; 1976.

4855 POOL SIZE, SYNTHESIS, AND TURNOVER OF SULFATED AND NONSULFATED BILE ACIDS IN PATIENTS WITH CHOLESTASIS [Abstract]. (Eng.) Stiehl, A.; Raedsch, R.; Ast, E.; Czygan, P.; Frohling, W.; Kommerell, B. (Medizinische Universitatsklinik, Univ. Heidelberg, Heidelberg, W. Germany). *Digestion* 14(5/6):462; 1976.

4856 A METABOLIC EVALUATION OF HEPATIC COMA AND RECOVERY [Abstract]. (Eng.) Hutson,

D. G.; Dombro, R.; Zeppa, R.; Ono, J.; Levi, J. U. (Univ. Miami Sch. Medicine, Miami, FL 33152). *Gastroenterology* 72(5, Part 2):1175; 1977.

4857 PLASMAPHERESIS IN A PATIENT WITH FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Horak, W.; Renner, F.; Grabner, G. (Ordinariat fur Gastroenterologie der Universitat Wien, Vienna, Austria). *Digestion* 14(5/6):519; 1976.

4858 EFFECT OF THE NEW RHONE-POULENC POLYACRYLONITRILE MEMBRANE ON PLASMA AMINO ACID LEVELS AND DEPTH OF COMA IN FULMINANT HEPATIC FAILURE [Abstract]. (Eng.) Silk, D. B. A.; Chase, R. A.; Trewby, P. N.; Weston, M. J.; Wheeler, P.; Hanid, A.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):550; 1976.

4859 ACUTE LIVER FAILURE. (Eng.) Knell, A. J. (Warwick General Hosp., Lakin Rd., Warwick, England). *Practitioner* 218(1304):230-237; 1977.

4860 BILE LIPID COMPOSITION AND BILE ACID POOL SIZE IN DIABETES [Abstract]. (Eng.) Ponz de Leon, M.; Carulli, N. (Istituto di Clinica Medica, Universita di Modena, Modena, Italy). *Digestion* 14(5/6):461; 1976.

4861 HYPERALIMENTATION IN FACE OF HEPATIC INSUFFICIENCY: A NEW APPROACH [Abstract]. (Eng.) Fischer, J. E.; Aguirre, A.; Funovics, J. M.; James, J. H.; Keane, J.; Wesdorp, I. C.; *et al.* (Massachusetts General Hosp., Boston, MA). *Acta Chir. Scand.* (Suppl. 466):104; 1976.

4862 HEPATITIS B SURFACE ANTIGENAEMIA IN KENYANS WITH CHRONIC LIVER DISEASE. (Eng.) Pettigrew, N. M.; Bagshawe, A. F.; Cameron, H. M.; Cameron, C. H.; Dorman, J. M.; MacSween, R. N. M. (Dept. Pathology, Univ. Nairobi, Nairobi, Kenya). *Trans. R. Soc. Trop. Med. Hyg.* 70(5/6): 462-465; 1976.

4863 HEPATITIS B VIRUS INFECTION AND PRIMARY HEPATOCELLULAR CARCINOMA [Abstract]. (Eng.) Tabor, E.; Gerety, R. J.; Vogel, C. L.; Bayley, A.; Anthony, P.; Barker, L. F. (Bureau Biologics, Food and Drug Admin., Bethesda, MD). *Digestion* 14(5/6):552-553; 1976.

4864 ACQUIRED DYSFIBRINOGENAEMIA IN LIVER DISEASE [Abstract]. (Eng.) Woolf, I. L.; Lane, D. A.; Scully, M. F.; Thomas, D. P.; Kakkar, V. V.; Williams, R. (King's Coll. Hosp., London, England). *Digestion* 14(5/6):556; 1976.

4865 PELIOSIS HEPATIS IN RENAL TRANSPLANT RECIPIENTS [Abstract]. (Eng.) Degott, C.; Potet, F.; Feldmann, G.; Rueff, B.; Benhamou, J. P. (Hopital Beaujon, Clichy, France). *Digestion* 14(5/6):467-468; 1976.

4866 GANGRENE OF THE HEPATIC ROUND LIGAMENT CAUSING DIFFUSE PERITONITIS: A CASE REPORT. (Eng.) Charuzi, I.; Freund, H. (Hadassah Univ. Hosp., Jerusalem, Israel). *Am. Surg.* 42(12): 925-926; 1976.

4867 INFECTIONS COMPLICATING ORTHOTOPIC LIVER TRANSPLANTATION. A STUDY EMPHASIZING GRAFT-RELATED SEPTICEMIA. (Eng.) Schroter, G. P. J.; Hoelscher, M.; Putnam, C. W.; Porter, K. A.; Hansbrough, J. F.; Starzl, T. E. (Univ. Colorado Medical Center, 4200 E. Ninth Ave., Denver, CO 80220). *Arch. Surg.* 111(12):1337-1347; 1976.

See also, 4423, 4438, 4534, 4558, 4559, 4560, 4567, 4568, 4569, 4588, 4592, 4600, 4602, 4614, 4647, 4719, 4773, 4777, 4805, 4871, 4887, 4890, 4904, 4906, 4923, 4932, 4935, 4942, 4951, 4981, 5032, 5037, 5042, 5043, 5049.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

4868 EFFECT OF PHOTOTHERAPY IN NITROGEN AND ELECTROLYTE LEVELS AND WATER BALANCE IN JAUNDICED PRETERM INFANTS. (Eng.) Wu, P. Y. K.; Moosa, A. (Women's Hosp., 1240 North Mission Rd., Los Angeles, CA 90033). *Pediatrics* 61(2):193-198; 1978.

To assess the pattern of water, electrolyte, and nitrogen retention and excretion after phototherapy, 24-hr metabolic balance studies were performed in 10 jaundiced preterm infants, 5 given phototherapy, and 5 controls. Each of the light-treated infants was studied twice, once during phototherapy (period I) and once 48 hr after phototherapy (period II). Control infants were similarly studied during the corresponding days. Compared to period II and control infants, during period I, the light-treated infants had less weight gain (1.8 ± 1.7 g/kg) than they did in period II (28.6 ± 3.4 g/kg) or than did the controls in periods I and II (17.8 ± 4.6 and 29.4 ± 3.5 g/kg, resp.). These differences were highly significant ($p<0.000$). Additionally, in the light-treated infants in period I, intestinal transit time was decreased by 50% ($p<0.000$); fecal excretion of nitrogen, sodium, and potassium was increased ($p<0.01$); stool water loss was increased twofold to threefold ($p<0.01$) with a decrease in water balance ($p<0.05$); and unmeasured water loss was increased ($p<0.01$). These studies underscore the need for careful attention to fluid and caloric supplementation during phototherapy.

4869 D-PENICILLAMINE TREATMENT OF PREMATURE BABIES WITH HYPERBILIRUBINEMIA. (Hun.) Koranyi, G.; Kovacs, J.; Voros, I. (Csecsemo es Gyermekosztaly, Fov. Peterfy Sandor utcai Korhaz-Rendelointezet, Budapest, Hungary). *Orv. Hetil.* 119(3):149-153; 1978.

4870 CONTINUOUS AND INTERMITTENT PHOTOTHERAPY IN THE PROPHYLAXIS OF HYPERBILIRUBINEMIA IN UNDERWEIGHT NEONATES. (Ita.) Romagnoli, C.; Polidori, G.; Cataldi, L.; De Turris, P. (Istituto di Clinica Pediatrica, Universita Cattolica del Sacro Cuore, Rome, Italy). *Minerva Pediatr.* 29(11): 805-808; 1977.

4871 NEONATAL JAUNDICE AND BILIARY ATRESIA. (Eng.) de Lorimier, A. A. (Univ. California, Sch. Medicine, San Francisco, CA 94143). *Surg. Clin. North Am.* 57(2):429-441; 1977.

See also, 4460, 4824.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

4872 IMMUNOLOGIC REACTIVITY OF PATIENTS WITH TOXIC HEPATITIS. (Rus.) Kleiner, A. I.; Getmanets, I. Ia.; Smolianinova, N. S.; Krylova, E. V.; Rezenkina, L. D.; Galas', G. S. (Inst. Vocational Hygiene and Occupational Diseases, Kharkov, USSR). *Gig. Tr. Prof. Zabol.* (7):15-18; 1977.

The state of immunologic reactivity was studied in 48 women with toluene derivative-induced toxic hepatitis. Clinical manifestations of the disease included abdominal pain, dyspepsia, and liver enlargement. The patients with toxic hepatitis had a marked increase of IgG content (986 mg%, compared to 881 mg% in healthy controls), a mild increase of IgA content (384 mg% versus 288 mg%) and significantly decreased lysozyme titer (34.4 ± 3.8 versus 61.6 ± 0.7, $p<0.001$). The direct hemagglutination reaction showed that 40% of the patients had antibodies against liver antigens, 48% had antibodies against pancreatic antigens, 41% had antibodies against stomach antigens, 11% had antibodies against heart antigens, 5% had antibodies against spleen antigens, and 4% had antibodies against kidney antigens.

4873 NITROFURANTOIN-INDUCED GRANULOMATOUS HEPATITIS. (Ger.) Strohscheer, H.; Wegener, H. H. (II. Med. Klinik, Rudolf-Virchow-Krankenhaus, Augustenburger Platz 1, D-1000 Berlin 65, W. Germany). *Munch. Med. Wochenschr.* 119(47):1535-1536; 1977.

Two women, aged 58 and 59 yr, developed clinically diagnosed granulomatous hepatitis, confirmed through biopsy, during nitrofurantoin treatment. Slight increase of the serum transaminase and alkaline phosphatase activities and marked increase in the serum alpha-2 globulins and IgG levels were seen. The examination of liver biopsy specimens revealed multiple granulomas measuring 150-350 μm in diameter, focal parenchymal necrosis, granulomatous proliferation of mesenchymal cells, marked eosinophil granulocyte infiltration, and polynuclear giant cells. Unlike hepatic changes simulating chronic hepatitis and toxic liver damage due to nitrofurantoin, there is no other known case of granulomatous hepatitis due to nitrofurantoin.

4874 ACUTE NECROSIS OF THE LIVER AFTER TREATMENT WITH OPIPRAMOL. (Dut.) van Vliet, A. C. M.; Frenkel, M.; Wilson, J. H. P. (Afdeling Inwendige Geneeskunde, Academisch Ziekenhuis Rotterdam-Dijkzigt, Rotterdam, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(34):1325-1327; 1977.

A 24-yr-old woman developed acute liver necrosis following a 10-day treatment with the tricyclic antidepressant opipramol (Insidon; 2 x 50 mg/day, p.o.). She died from liver necrosis and its complications 11 days later. In the absence of toxoplasmosis, viral hepatitis, or alcohol use, a causal connection between opipramol and the hepatopathy is considered probable.

4875 DIHYDRAZINE-INDUCED ACUTE HEPATITIS IN IgM DEFICIENCY. (Ger.) Knoblauch, M.; Cueni, B.; Spycher, M.; Schmid, M. (Medizinische Universitatsklinik, Kantonsspital, Ramistrasse 100, CH-8091 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 107(19):651-656; 1977.

See also, 4804, 4812, 4814, 4827, 4864.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

4876 ACUTE HEPATITIS IN CHILDHOOD. (Ger.) Franzen, C.; Brodersen, M. (Universitats-Kinderklinik, Josef-Schneider-Strasse, 8700 Wurzburg, W. Germany). *Therapiewoche* 27(39):6734, 6737, 6738, 6740; 1977.

An epidemiological analysis of 146 children (67 boys, 79 girls) with acute hepatitis that occurred during the 1968-1975 period in the Wurzburg area is presented. Nine boys and 14 girls had hepatitis B; 58 boys and 65 girls had non-B hepatitis. Eight of the 23 patients with hepatitis B acquired the hepatitis in the hospital due to surgery or blood transfusion, 1 acquired it in the family, 3 in children's homes, 1 during travel in Mediterranean countries, and 1 after moving to another area. The source of the infection could not be established in nine cases. Thirty-nine of the 123 HBsAg-negative patients acquired hepatitis during epidemics (16 in the family, 7 in children's homes, and 16 in kindergarten, school, or neighborhood), 12 acquired it during travel in Mediterranean countries or after moving to another area, and 39 during small-scale epidemics. The source was not established in 33 cases. Unlike the situation in the children, hepatitis B was dominant in the adult population during the same period in the same geographic region.

4877 STUDY OF CAUSES OF HIGH CASE FATALITY AND OF OUTCOME OF PREGNANCY IN VIRAL HEPATITIS. (Eng.) Puvacic, Z.; Gaon, J.; Bryan, J.; Kendrick, M. (Medical Center, Travnik, Yugoslavia). *Acta Med. Iugosl.* 31(4):305-320; 1977.

Mortality rates among pregnant women suffering from icteric viral hepatitis (749 cases with type A, 73 with type B, 23 with type undetermined) were examined for the period 1964-1974 in Bosnia-Herzegovina, Yugoslavia, and the effects of hepatitis infection on spontaneous abortions, premature deliveries, stillbirths, and time of birth of abnormal infants were analyzed. Of the 845 women, 585 were investigated retrospectively and 260 prospectively. The mortality rate was analyzed according to nationality, age, geographic area, degree of physical effort during pregnancy, and type of diet. Of the 664 Moslem women investigated, 113 died during pregnancy, while only 6 of the 181 non-Moslem women died at this time ($p<0.001$). There was a significant difference ($p<0.0027$) between the case fatality of rural (114/725) and urban (5/120) residents. The high mortality rate among Moslem women was not related to ethnic factors but rather to poorer social and economic conditions. More women with hepatitis died during the third trimester of pregnancy than during the other two trimesters combined (20.83% versus 2.44% and 6.00% for the 1st and 2nd trimesters, resp.). The time of delivery presented a serious risk to life; 48 died at partus prematurus and 37 at partus maturus. Two prominent causes of the high mortality rate ($p<0.001$) were poor diet, with regard to both quantity and quality, and hard physical labor during pregnancy ($p<0.001$). The number of premature deliveries, stillbirths, and normal and abnormal full-term babies did not differ significantly in the pregnant women with hepatitis and in the healthy controls. Hepatitis virus does not present any teratogenic risk with regard to full-term babies.

4878 HEPATITIS B INFECTION IN PHYSICIANS: RESULTS OF A NATIONWIDE SEROEPIDEMIOLOGIC SURVEY. (Eng.) Denes, A. E.; Smith, J. L.; Maynard, J. E.; Doto, I. L.; Berquist, K. R.; Finkel, A. J. (Center for Disease Control, U.S. Public Health Service, U.S. Dept. Health, Education and Welfare, Phoenix, AZ). *JAMA* 239(3):210-212; 1978.

A seroepidemiologic survey of physicians attending three American Medical Association conventions in 1975 and 1976 was conducted to define the epidemiologic features of occupationally acquired hepatitis B infection. Of 1,192 participating physicians, 18.5% had serologic evidence of prior hepatitis B virus infection (positive hepatitis B surface antibody). The infection rate was higher among those practicing in urban communities (27.2%) than in smaller communities (15.6%, $p<0.001$); it increased with the number of years in practice;

and among specialties, it was highest in pathologists (27%) and surgeons (28%). The serologic data demonstrated a changing pattern of viral hepatitis related to entry into the medical profession, with hepatitis B accounting for a majority of clinical hepatitis experienced after beginning medical practice.

4879 NATURAL HISTORY OF ACUTE HEPATITIS B IN PREVIOUSLY HEALTHY PATIENTS: A PROSPECTIVE STUDY.

(Eng.) Niermeijer, P.; Gips, C. H. (Majella Hosp., Bussum, Netherlands). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):317-325; 1977.

To relate the time of onset of first symptoms and signs and of biochemical disturbances in acute hepatitis B to well-defined disease stages, the natural history of acute hepatitis B was studied in 38 patients. Fatigue began a median of 4 weeks, abdominal symptoms a median of 3 weeks, and signs of cholestasis a median of 2.5 weeks before peak SGPT values were reached. Extrahepatic manifestations occurred throughout the prodromal stage, and the presence of arthropathy, urticaria, or skin rashes was not related to the biochemical severity of the liver disease. The higher the maximal values of serum bilirubin and/or the older the patient, the longer the period of bilirubin elevation; a maximal bilirubin elevation less than 20 times the upper limit of normal was associated with normalization of serum bilirubin within 6 weeks. No such correlations were found between the levels of SGPT, serum alkaline phosphatase, thymol turbidity, or cholesterol and the subsequent duration of their abnormality. The institution of bedrest before peak SGPT was attained was associated with normalization of SGPT levels within 8 weeks after peak levels were reached. Thirty-seven patients recovered completely. In the remaining patient, hepatitis B surface antigenemia and slight SGPT elevation persisted. In this patient, bedrest was instituted late in the course of the disease. The influence of bedrest therapy on disease outcome remains to be clarified.

4880 IDIOPATHIC GRANULOMATOUS HEPATITIS WITH A PROLONGED COURSE: EFFECT OF CORTICOSTEROID THERAPY.

(Eng.) Penchas, S.; Ligumski, M.; Eliakin, M. (Hadassah Univ. Hosp., Jerusalem, Israel). *Digestion* 17(1):46-55; 1978.

The effect of corticosteroids on chronic idiopathic granulomatous hepatitis is explored through four case studies (3 men and 1 woman). The diagnoses were established by liver biopsy in three cases and by laparotomy in one. Three of the four patients had symptoms such as fever with chills, a spiking fever of prolonged duration (and unresponsive to antibiotics), weight loss, rapid ESR, and normal WBC count. The fourth patient had severe perihepatitis (disclosed at laparotomy) with symptoms of pain, fever, and myalgia. In all patients there was a twofold elevation of SGOT and alkaline phospatase activities and a prolongation in prothrombin time occurring several weeks after onset of fever. The disease had a chronic course (5 and 10 yr in 2 cases, and 4 and 6 weeks in the other 2 cases) before the beginning of steroid therapy. In all patients, the administration of relatively high doses of prednisone or ACTH resulted in a prompt fall in temperature and marked improvement in the general state. Cessation of prednisone or ACTH therapy was followed by relapse in all cases. The etiology of the disease remains unknown in these patients.

4881 TREATMENT OF ACUTE VIRAL HEPATITIS WITH (+)-CYANIDANOL-3.

(Ger.) Pelloni, S.; Berthet, P.; Blum, A. L.; Doelle, W.; Goebell, H.; Kortum, K.; *et al.* (Medizinische Klinik, Stadtspital Triemli, CH-8063 Zurich, Switzerland). *Schweiz. Med. Wochenschr.* 107(49):1859-1861; 1977.

The effectiveness of (+)-cyanidanol-3 (C, 4 x 500 mg/day for 4 weeks) was studied in 51 patients with acute viral hepatitis and compared with the results in 49 patients with acute viral hepatitis treated with placebo in a cooperative double-blind therapeutic trial. Compared with the placebo group, there was a significant improvement in the C-treated group concerning such symptoms as nausea ($p<0.01$), anorexia ($p<0.05$), and pruritus ($p<0.02$). Abdominal discomfort was also alleviated significantly ($p<0.02$) in the HBsAg-positive patients treated with C. The reduction of the serum bilirubin level was twice as fast in the C-treated patients than in the placebo group. Major side-effects were not seen during the treatment or during the 6-month follow-up period. None of the C-treated patients developed recurrences during the first 6 months after treatment.

4882 AN EVALUATION OF URINARY D-GLUCARIC ACID EXCRETION DURING ACUTE HEPATITIS IN MAN.

(Eng.) Carrella, M.; D'Arienzo, A.; Manzillo, G.; De Ritis, F. (Stanford Univ. Sch. Medicine, Stanford, CA 94305). *Am. J. Dig. Dis.* 23(1):18-22; 1978.

In an effort to clarify the effect of hepatitis on microsomal enzymes, the excretion of urinary D-glucaric acid (D-GA) was determined in 49 patients with acute hepatitis and in 12 controls. A 3.7-fold increase of D-GA was found at an early stage of the disease (37.13 ± 3.08 μmol/24 hr versus 9.91 ± 1.18 μmol/24 hr in controls), when serum transaminases and bilirubin were very high (SGOT, 589 ± 41 IU; SGPT, 954 ± 61 IU; serum bilirubin, 8.41 ± 0.76 mg/100 ml, $p<0.001$). A lower but still significantly elevated D-GA excretion was also found in the recovery phase of hepatitis at a time when both serum transaminases and bilirubin were considerably reduced (SGOT, 89 ± 14 IU; SGPT, 185 ± 30 IU; serum bilirubin, 1.05 ± 0.20 mg/100 ml, $p<0.001$). Urinary glucuronides and free glucuronic acid, measured as total glucuronic acid, were also markedly increased in early hepatitis (1,164 ± 54 mg/24 hr versus 782 ± 84 mg/24 hr in controls), but no correlation was found with D-GA excretion. Phenobarbital treatment (100 mg/day, p.o.) for 5 days, which led to a threefold increase of D-glucaric acid in all 12 normal subjects, did not cause any further change in the 28 treated patients with early acute hepatitis. While the mechanism of the urinary D-GA increase in hepatitis still remains undefined, the findings support the conclusion that its increase may not reflect an induction of liver microsomal enzymes.

4883 SIGNIFICANCE OF THE DETERMINATION OF GAMMA-GLUTAMYL TRANSPEPTIDASE AND CHANGES OF THE ENZYME ACTIVITY IN ACUTE HEPATITIS.

(Hun.) Udvardy, M.; Kulcsar, A.; Munnich, D.; Dalmi, L. (II. Belgyogyaszoti Klinika, Debreceni Orvostudomanyi Egyetem, Debrecen, Hungary). *Orv. Hetil.* 118(40):2397-2398; 1977.

The value of the γ-glutamyltranspeptidase (GTTP) determination was studied in 28 hepatitis B surface antigen (HBsAg)-negative and 18 HBsAg-positive patients with acute hepatitis and in 40 healthy controls. There was no significant difference in the GGTP levels between the HBsAg-positive and -negative patients. The GGTP level was slightly but consistently increased in the patients throughout the 6-week observation period compared with the controls, but the levels decreased in the course of the treatment (from an initial 79-88 mU/ml to 40-58 mU/ml during the 6th week). The GGTP level was increased even after the normalization of the SGOT and SGPT activities, which indicates that the GGTP test is a more sensitive indicator of the progression of the recovery process than are the SGOT and SGPT tests.

4884 MICROBIOLOGICAL AND IMMUNOLOGICAL ASPECTS OF HEPATITIS.

(Ger.) Maass, G. (Institut fur Virusdiagnostik am Hyg.-bakt. Landesuntersuchungsamt, von-Stauffenberg-Strasse 36, 4400 Munster, W. Germany). *Therapiewoche* 26(38):5972-5978, 5981; 1976.

Studies on the microbiological and immunological aspects of hepatitis A and B are reviewed. Hepatitis A virus has a size of 27 nm. Its virion probably contains RNA. The virus does not carry hepatitis B surface antigen (HBsAg). The incubation time is usually 25-30 days, and the virus can be detected in the blood and feces 2 weeks before and 1 week after jaundice. Hepatitis B virus, 42 nm in size, contains DNA in its virion. Its incubation time is 60-90 days, and the virus is detectable in the blood for months to years, and occasionally in the feces. It was possible to infect South American marmosets with hepatitis A virus; the animals developed symptoms similar to those of hepatitis in man. The animals acquired specific immunity, and virus particles similar to those found in the feces of patients with hepatitis A were found in the serum during the infection. The virus particles were specifically agglutinated by the serum convalescent hepatitis A patients. Hepatitis B virus caused asymptomatic infection in rhesus monkeys and chimpanzees, but it was not transmissible to marmosets. Type *d* Australia (Au) antigen was found in 189/322 hepatitis patients and type *y* in 85/322. The incidences of type *d* and *y* Au antigen in Au-antigen carriers were 27/31 and 4/31, resp. Antibodies to HBsAg were found in 6.8% of blood donors, in 17.2% of medical personnel, in 15.3% of patients with HBsAg-positive hepatitis, in 30.6% of convalescent HBsAg hepatitis patients, and in 0% of HBsAg carriers.

4885 HEPATITIS A VIRUS INFECTION: NEW INSIGHTS FROM SEROEPIDEMIOLOGIC STUDIES.

(Eng.) Dienstag, J. L.; Szmuness, W.; Stevens, C. E.; Purcell, R. H. (Massachusetts General Hosp., Boston, MA 02114). *J. Infect. Dis.* 137(3):328-340; 1978.

Studies suggesting a comprehensive pattern of the epidemiology of type A hepatitis and concerning its natural perpetuation are reviewed. The prevalence of exposure to hepatitis A virus (HAV) increases with increasing age, decreases with increasing socioeconomic class, increases with increasing serologic evidence of prior hepatitis B virus (HBV) exposure but is much more common than HBV exposure, is independent of sex and race, is not affected by immune deficiency or immaturity, and varies in different parts of the world as a function of hygienic, developmental, and unrecognized geographic factors. Transmission of type A hepatitis is enhanced by poor personal hygiene such as that seen in institutions for the mentally retarded. On the other hand, there is no increased exposure to HAV among homosexuals (who have frequent and intimate contact with multiple sexual partners), among hemodialysis patients and staff, or among multiply transfused individuals, all of whom are at significantly increased risk of exposure to HBV. No epidemiologic evidence has confirmed the existence of viremic or intestinal carriers of HAV, and the virus is rarely, if ever, spread by parenteral mechanisms. Finally, HAV appears to play no role in chronic liver disease and a very minor role in fulminant hepatitis; however, HAV is responsible for 20% to 40% of sporadic hepatitis among urban adults.

4886 THE PREVALENCE OF ANTIBODY TO HEPATITIS A ANTIGEN IN VARIOUS PARTS OF THE WORLD: A PILOT STUDY.

(Eng.) Szmuness, W.; Dienstag, J. L.; Purcell, R. H.; Stevens, C. E.; Wong, D. C.; Ikram, H.; *et al.* (New York Blood Center, 310 E. 67th St., New York, NY 10021). *Am. J. Epidemiol.* 106(5):392-398; 1977.

Samples from 1,297 blood donors or patients with non-liver diseases from seven countries were surveyed for antibody to hepatitis A antigen (anti-HA) by immune adherence hemagglutination and for antibody to hepatitis B surface antigen (anti-HBs) by radioimmune assay. The age-standardized anti-HA prevalence was 28.7% in Switzerland, 44.7% in the USA, 76.2% in Senegal, 81.1% in Belgium, 88.7% in Taiwan, 95.3% in Israel, and 96.9% in Yugoslavia. Among subjects 18-19 yr of age, only 5-10% of Swiss and Americans had anti-HA, whereas 92-100% of subjects in the same age group from Israel, Yugoslavia, Taiwan, and Senegal had this antibody. A close correlation between anti-HA and anti-HBs prevalence was seen in five countries; however, in Belgium and Israel, anti-HBs rates were low while anti-HA rates were very high. This survey confirms that hepatitis A virus infections are widespread throughout the world and that their occurrence and age-distribution are determined to a large extent by environmental and socioeconomic conditions. In view of the unrepresentative nature of the population samples surveyed, these findings should be confirmed using other samples.

4887 HEPATIC PATHOLOGIC CONDITION IN ASYMPTOMATIC AUSTRALIA ANTIGEN CARRIERS: A LIGHT MICROSCOPICAL STUDY OF 26 CASES AND A REVIEW OF THE LITERATURE.

(Eng.) Shrago, S. S.; Auslander, M. O.; Gitnick, G. L. (Univ. California at Los Angeles Center for the Health Sciences, Los Angeles, CA 90024). *Arch. Pathol. Lab. Med.* 101(12):648-651; 1977.

Liver histology was studied in 26 Australia antigen carriers who were asymptomatic with normal liver function tests. The carriers are part of a prospective and long-term study designed to analyze the clinical and pathological consequences of persistent, though asymptomatic antigenemia. The liver abnormalities that were indicated on biopsy included 15 specimens with "inflammatory changes" that were characterized by intralobular foci of mononuclear cells and/or portal tract infiltrates. Fifteen specimens demonstrated "ground-glass" cells. Nine specimens showed fatty change and three were normal. These results in conjunction with cases in the literature indicate a narrow and mild spectrum of liver biopsy specimen abnormalities in the asymptomatic carrier with normal liver function tests. Any prognostic inference from this liver biopsy data is premature and clinical follow-up of carriers is advocated.

4888 IMMUNOHISTOCHEMICAL PATTERNS OF HEPATITIS B SURFACE ANTIGEN (HBsAg) IN PATIENTS WITH HEPATITIS, RENAL HOMOGRAFTS RECIPIENTS, AND NORMAL CARRIERS.

(Eng.) Camilleri, J. P.; Amat, C.; Chousterman, M.; Petite, J. P.; Duboust, A.; Boddaert, A.; *et al.* (Hopital Broussais, 96, rue Didot, F-75014 Paris, France). *Virchows Arch. [Pathol. Anat.]* 376(4):329-341; 1977.

A series of 180 Bouin-fixed and paraffin embedded liver biopsies from 147 patients was investigated for the presence of hepatitis B surface antigen (HBsAg) by histochemical and indirect immunofluorescence techniques, to determine whether the immune response of the host plays a role in the genesis of the diverse pathological patterns. A comparison between orcein staining and Masson's trichrome preparations for ground-glass hepatocytes showed that immunofluorescence was both the more reliable and the more specific method for detection of HBsAg in liver tissue. The ability to perform this technique on paraffin sections facilitates systematic studies and allows retrospective work-up. HBsAg-positive hepatocytes were found in approximately two-thirds of the sera of all HBsAg-positive patients, but never in HBsAg-negative patients. HBsAg-positive cells were observed in healthy chronic carriers and in all forms of chronic hepatitis, but never in acute HBsAg-positive hepatitis. In chronic hemodialysis and renal transplant patients, 45% were seropositive; HBsAg-positive hepatocytes were found in 34%. The incidence of the antigen was higher in patients followed after transplantation than in those followed during hemodialysis. The results of this study show no relationship between the immunohistochemical pattern and the histological activity of the disease.

4889 IMMUNE RESPONSE TO HEPATITIS B VIRUS IN CHILDREN WITH PAPULAR ACRODERMATITIS.

(Eng.) Colombo, M.; Gerber, M. A.; Vernace, S. J.; Gianotti, F.; Paronetto, F. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY). *Gastroenterology* 73(5):1103-1106; 1977.

To study the course of hepatitis B virus infection, 16 patients with childhood papular acrodermatitis (PAC), 2 to 7 yr of age, were followed for periods ranging from 6 to 46 months. All patients tested developed hepatitis B surface antigenemia subtype *ay*, and produced antibody to hepatitis B core antigen (anti-HBc) with the highest incidence after 3 to 5 months. Half of the children investigated developed antibody to hepatitis B surface antigen (anti-HBs) 4 to 18 months (mean, 6.5) after the onset of PAC. At the end of the investigation, 31% of the children were still hepatitis B surface antigen (HBsAg)-positive, 50% were anti-HBc-positive, and in 43% the activity of serum aminotransferases was abnormal. Liver biopsy repeated in two children showed chronic aggressive hepatitis. The pattern of antibody response to hepatitis B virus is similar in both HBsAg-positive hepatitis and PAC. The frequent development of the HBsAg carrier state and the high proportion of children with liver abnormalities at the end of the investigation suggest an impaired clearance of hepatitis B virus and a tendency to chronicity.

4890 ORCEIN STAINING OF HEPATITIS B SURFACE ANTIGEN IN PARAFFIN SECTIONS OF LIVER ON AUTOPSY CASES.

(Eng.) Sakurai, M.; Miyaji, T. (Osaka Univ. Medical Sch., 33 Joancho, Nitaku, Osaka, Japan). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):334-339; 1977.

Paraffin sections of 227 liver biopsy specimens taken at autopsy were stained by a modified orcein method, and sera from all cases were tested for hepatitis B surface antigen (HBsAg) and antibody to HBsAg (anti-HBs) to determine if there was a correlation between the presence of orcein-positive hepatocytes and the antigen and/or antibody. HBsAg was tested by an immune adherence hemagglutination method, and anti-HBs was determined by a passive hemagglutination method. Among patients whose sera were HBsAg-positive but anti-HBs-negative, 13 of 19 with cirrhosis and hepatoma, 2 of 3 with cirrhosis without hepatoma, and 2 of 3 with noncirrhotic neoplastic diseases other than hepatoma had orcein-positive hepatocytes. Among patients who were seronegative for both HBsAg and anti-HBs, 4 of 24 with cirrhosis with hepatoma, 2 of 19 with cirrhosis without hepatoma, and 3 of 60 with noncirrhotic neoplastic diseases other than hepatoma had orcein-positive hepatocytes. Among those who were seronegative for HBsAg but positive for anti-HBs, orcein-positive hepatocytes occurred in 1 of 6 cases of cirrhosis with hepatoma and in 1 of 21 cases of noncirrhotic neoplastic diseases other than hepatoma. Among the patients seropositive for both HBsAg and anti-HBs, orcein-positive cells were found in one of three cases of cirrhosis with hepatoma. No orcein-positive hepatocytes were detected in cases of hepatoma without cirrhosis or in cases of noncirrhotic non-neoplastic diseases in any of the serologic groups.

4891 DETECTION OF HEPATITIS B ANTIGEN IN CIRCULATING IMMUNE COMPLEXES IN ACUTE AND CHRONIC HEPATITIS. (Eng.) Carella, G.; Digeon, M.; Feldmann, G.; Jungers, P.; Drouet, J.; Bach, J. F. (Hopital Necker, 161, rue de Sevres, 75730 Paris, Cedex 15, France). *Scand. J. Immunol.* 6(12): 1297-1304; 1977.

In an effort to learn whether hepatitis B surface antigen (HBsAg) may be found concealed in circulating immune complexes after it has disappeared from the serum, the polyethylene glycol precipitation at low concentration (PEG test) and the radiolabeled complement component Clq binding test were used to detect immune complexes in the sera of patients with acute and chronic hepatitis and HBsAg carriers. Immune complexes were detected in sera from 23 of 28 patients with acute hepatitis, 28 of 32 with chronic hepatitis, 7 of 19 hemodialyzed patients with chronic hepatitis B surface (HBs) antigenemia, and 2 of 11 asymptomatic HBsAg carriers. After treatment of PEG precipitates with acidic pH, heating, or proteolytic enzyme (protease), electroimmunodiffusion or radioimmunoassay revealed the presence of HBsAg or antibody in dissociated immune complexes in sera from several acute and chronic hepatitis patients. Electron microscopy showed immune complexes of hepatitis B virus in 9 of 12 PEG precipitates obtained from PEG test-positive sera; these 9 precipitates were from patients with acute or chronic hepatitis and the other from chronic HBsAg carriers. Free hepatitis B virus particles were observed after protease digestion of PEG precipitates. Neither immune complexes nor virus particles were seen in precipitates from PEG test-negative but HBsAg-positive sera from chronic carriers. This simple test for HBsAg-anti HBs complexes may prove a useful tool in predicting disease outcome and/or for understanding related phenomena.

4892 FREQUENCY OF DETECTION OF HB-ANTIGEN AND ITS SUBTYPES IN THE POPULATION OF DIFFERENT GEOGRAPHICAL ZONES OF THE USSR AND IN PATIENTS WITH VIRAL HEPATITIS. (Rus.) Ketiladze, E. S.; Vorozhbieva, T. E. (D. I. Ibanovskii Inst. Virology, Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (9):13-17; 1977.

The incidence of hepatitis B surface antigen (HBsAg) was studied in various populations of the Soviet Union and among high-risk groups. The frequency of HBsAg in the sample of 1805 practically healthy individuals was 2.8% (3.4% in men and 2.2% in women); the frequency of HBsAg was greater in the southern regions of the Soviet Union (8.6% in Georgia, 7.9% in Moldavia, and 5.3% in Middle Asia). The incidence of antigen was markedly greater in a sample of 594 hospitalized tuberculous patients (15.1%) and among personnel of a hemodialysis unit (11.4%). Among 3,032 patients with acute viral hepatitis and 178 patients with chronic hepatitis and cirrhosis, the incidence of HBsAg was 38.6% and 9.6%, resp. The antigen subtype *ay* was observed in 90.6% of the patients with viral hepatitis and in 86.5% of the HBsAg carriers. The incidence of the *ad* subtype was greater among adult patients with viral hepatitis and adult carriers (13.5-28.5%) compared with children (0-3.6%).

4893 PREVALENCE AND EPIDEMIOLOGIC SIGNIFICANCE OF ANTIBODY TO HEPATITIS B CORE ANTIGEN IN GREECE. (Eng.) Papaevangelou, G.; Karaboyia-Karafyllidis, P.; Kyriakidou, A. (52 Skoufa St., Athens 135, Greece). *Am. J. Epidemiol.* 106(6):502-503; 1977.

The diagnostic and epidemiologic significance of antibody to hepatitis B core antigen (anti-HBc) detected by complement fixation was studied in a sample of 412 healthy residents (aged 0-70 yr) of the Athens area. The prevalence of hepatitis B virus (HBV) infections was found to be very high (26.5%), and the hepatitis B surface antigen (HBsAg) carrier rate (4.1%) was among the highest in Europe. Anti-HBc was detected in 63 of the examined persons. In 10 of them, anti-HBc was the only evidence of HBV infection. The prevalence of anti-HBc (without HBsAg or anti-HBs) increased with age, while the HBsAg carrier rate declined in older age groups. The frequency of anti-HBc detection in persons with anti-HBs declined with age, indicating that anti-HBc persists for a shorter period than the anti-HBs after HBV infection. These data stress the importance of anti-HBc testing in increasing the sensitivity of the detection of potentially infective HBV carriers as well as in studying various epidemiologic aspects of HBV infection.

4894 THE DIAGNOSTIC SIGNIFICANCE OF ANTIBODIES AGAINST HEPATITIS B CORE ANTIGEN. (Eng.) Gerlich, W. H.; Biswas, R. M.; Stamm, B.; Thomssen, R. (Hygiene-Institut der Universitat, Kreuzbergring 57, D-3400 Gottingen, W. Germany). *Klin. Wochenschr.* 55(21):1051-1056; 1977.

The frequency of hepatitis B was examined using three serological parameters: hepatitis B surface antigen (HBsAg), antibody to HBsAg (antiHBs), and antibody to hepatitis B core antigen (antiHBc). All three substances were detected qualitatively by radioimmunology. Of 1,216 patients with acute hepatitis, 55% were HBsAg- and antiHBc-positive on admission to hospital. A further 17.8% had no HBsAg but were antiHBc-positive and also partly antiHBs-positive. Among the latter patients, some (8.6% of all patients) had a high antiHBc concentration during the acute phase. Similar anti-HBc concentrations were seldom found (0.04%) in

HBsAg-negative blood donors. AntiHBs in the patients was at first mainly negative and then appeared during reconvalescence. These cases were considered to be acute hepatitis type B, although HBsAg was absent. In the remaining HBsAg-negative, antiHBc-positive patients who were also partly antiHBs-positive, antiHBc was present in low concentrations (9.2% of all patients). In the majority of cases, antiHBs had been present from the beginning. The same antibody constellation was found in 3.6% of 2,341 blood donors. In the group of patients, it is supposed that the acute hepatitis present is not of type B and has a different etiology. The low concentration of antibody is interpreted to be a sign of an earlier hepatitis B virus infection.

4895 PROGNOSTIC IMPLICATIONS OF THE e ANTIGEN OF HEPATITIS B VIRUS.

(Eng.) Fay, O.; Tanno, H.; Roncoroni, M.; Edwards, V. M.; Mosley, J. W.; Redeker, A. G. (Faculty Biochemistry, Univ. Rosario, Mitre 1174, 2000 Rosario, Argentina). *JAMA* 238(23):2501-2503; 1977.

The value of the presence or absence of the e antigen (HBeAg) and its antibody (anti-HBe) in predicting the prognosis of hepatitis B infection was studied in 159 patients with acute hepatitis (with early resolution), 18 with acute hepatitis that became chronic, and 129 with chronic hepatitis. The detectability of HBeAg in the acute phase of type B hepatitis was followed by a sixfold higher incidence of chronic hepatitis. Unfortunately, the prediction was erroneous in 65% of positive cases and 6% of negative cases. In chronic hepatitis, HBeAg did not necessarily disappear in advance of resolution, and its disappearance did not necessarily indicate resolution. Two patients with acute hepatitis progressing to chronicity were anti-HBe-positive in both phases, as were seven with chronic hepatitis. For individual patients, therefore, HBeAg and anti-HBe are not prognostically useful indexes.

4896 HEPATITIS B SURFACE ANTIGEN AND e ANTIGEN IN PLEURAL EFFUSION: A CASE REPORT.

(Eng.) Tabor, E.; Russell, R. P.; Gerety, R. J.; Barker, L. F.; Hillis, W. D.; Jackson, D. R. (Bureau Biologics, 8800 Rockville Pike, Bethesda, MD 20014). *Gastroenterology* 73(5):1157-1159; 1977.

The case of a 40-yr-old dialysis patient is reported in whom hepatitis B e antigen (HBeAg) and hepatitis B surface antigen (HBsAg) were demonstrated in both pleural fluid and in serum. The titers of HBsAg and HBeAg were similar in serum and pleural fluid, 1:200 and 1:100 in serum and pleural effusion, resp., and 1:2 and 1:1 in serum and pleural effusion, resp. Examination of the pleural fluid by electron microscopy revealed the presence of intact (42 nm) hepatitis B virus particles. These findings underline the potential hepatitis B virus infectivity of other body fluids besides blood, especially for medical and laboratory personnel.

4897 e ANTIGEN AND ANTIBODY, DNA POLYMERASE, AND INHIBITORS OF DNA POLYMERASE IN ACUTE AND CHRONIC HEPATITIS.

(Eng.) Cappel, R.; De Cuyper, F.; Van Beers, D. (Institut Pasteur du Brabant, 28 Rue du Remorqueur, 1040 Brussels, Belgium). *J. Infect. Dis.* 136(5):617-622; 1977.

To study new approaches to the evaluation of hepatitis B (HB) infections, the occurrence of HBe antigen (HBeAg) and its antibody (anti-HBe), DNA polymerase, and an inhibitor of this polymerase was investigated in 91 patients with acute hepatitis, 44 with chronic hepatitis, 53 with chronic carriers of the HB surface antigen (HBsAg), and 50 healthy controls. The sensitivities of the radioimmunoassay and the DNA polymerase test in the diagnosis of HB were compared. There was a high correlation between HBeAg and DNA polymerase activity in carriers of HBsAg undergoing hemodialysis as well as in patients with acute hepatitis undergoing hemodialysis but not in nonhemodialyzed acute hepatitis patients. Among patients with chronic hepatitis, 33 had HBsAg and 18 also had DNA polymerase activity; the latter activity was seen more frequently in those with aggressive hepatitis and rarely in those with persistent hepatitis. Additionally, HBeAg was found in 9/30 patients with aggressive hepatitis but in 0/14 with persistent hepatitis ($p<0.01$), confirming the reports that the presence of HBeAg in chronic hepatitis indicates a poor prognosis. Anti-HBe was present in 50% of chronic carriers and patients with persistent hepatitis but in only 6% of the patients with chronic aggressive hepatitis. Hence, only persistent HBe antigenemia and presence of DNA polymerase activity have prognostic value, since they probably reflect viral replication. DNA polymerase activity was present only transiently in acute hepatitis and could be a useful diagnostic tool. Inhibitors of DNA polymerase, which may be antibodies, appeared regularly very early in the course of acute hepatitis, suggesting that they may be associated with viral replication. Their persistence may be of prognostic value since they were found in 62% of patients with chronic aggressive hepatitis but not at all in patients with persistent hepatitis. Since the DNA polymerase test was performed on 20-fold concentrated sera, this test is not more sensitive than the radioimmunoassay but could be helpful in the diagnosis of acute hepatitis in the early stages of the disease.

4898 HEPATITIS B "e" ANTIGEN: AN APPARENT ASSOCIATION WITH LACTATE DEHYDROGENASE ISOZYME-5.

(Eng.) Vyas, G. N.; Peterson, D. L.; Townsend, R. M.; Damle, S. R.; Magnius, L. O. (Dept. Lab. Medicine, Univ. California, San Francisco, CA 94143). *Science* 198(4321):1068-1070; 1977.

Sera containing the "e" antigen of hepatitis B virus were subjected to electrophoresis in polyacrylamide gel. An extra band appeared in the lactate dehydrogenase isozyme pattern, but this band was undetectable in sera containing antibodies to the e antigenic determinant. Prior separation of the lactate dehydrogenase isozyme-5 fraction by chromatography of serum on minicolumns of diethylaminoethyl-Sephadex-A50 improved the electrophoretic identification of the extra band. Neutralization with antibodies to the e antigen as well as by antibodies to the homologous *d* or *y* component of the hepatitis B surface antigen removed the extra band; antibodies to the lactate dehydrogenase isozyme-5 removed both the normal and the extra enzymatic band of isozyme-5. This feature of the e antigen provides a potential assay system for the laboratory diagnosis of hepatitis B and suggests its possible role in pathogenesis of hepatocellular injury.

4899 FAILURE OF HYPERIMMUNE SERUM GLOBULIN, GIVEN SEVERAL DAYS AFTER EXPOSURE, TO PROTECT AGAINST HEPATITIS B [Letter to Editor]. (Eng.) Frosner, G. G.; Frosner, H. R.; Dienhardt, F.; Haussman, W.; Knabi, U. H. (Max-v.-Pettenkofer-Institut, Univ. Munchen, 8000 Munich 2, W. Germany). *Lancet* 2(8046):1023; 1977.

4900 EXPRESSION OF HEPATITIS B VIRUS-SPECIFIC MARKERS IN ASYMPTOMATIC HBsAg CARRIERS [Abstract]. (Eng.) Hess, G.; Arnold, W.; Shih, J. W. K.; Kaplan, P. M.; Purcell, R. H.; Gerin, J. L.; Meyer zum Buschenfelde, K. H. (Klinikum Charlottenburg, Freie Universitat Berlin, Berlin, W. Germany). *Digestion* 16(4):321-322; 1977.

4901 ENZYME-LINKED IMMUNOSORBENT ASSAY FOR DETECTION OF HEPATITIS A ANTIGEN IN STOOL AND ANTIBODY TO HEPATITIS A ANTIGEN IN SERA [Abstract]. (Eng.) Mathiesen, L. R.; Feinstone, S. M.; Skinhoej, P.; Purcell, R. H. (State Serum Inst., Copenhagen, Denmark). *Digestion* 16(4):321; 1977.

4902 DETECTION OF CIRCULATING IMMUNE COMPLEXES (CIC) IN SERA OF PATIENTS WITH ACUTE AND CHRONIC VIRUS HEPATITIS USING THE Clq-DEVIATION METHOD [Abstract]. (Eng.) Sodomann, C. P.; Prokein, K.; Schmidt, H.; Havemann, K. (Clinic Medicine, Univ. Marburg, Marburg a.d. Lahn, W. Germany). *Digestion* 16(4):356; 1977.

4903 RENAL FAILURE AND ELECTROLYTE IMBALANCE IN FULMINANT HEPATITIS AND TERMINAL CIRRHOSIS. A COMPARISON BETWEEN FREQUENCY AND TYPES [Abstract]. (Eng.) Ring-Larsen, H.; Palazzo, U. (Rigshospitalet, Copenhagen, Denmark). *Digestion* 16(4):349; 1977.

4904 THE EFFECT OF SELECTIVE AMINO ACID INFUSIONS ON METABOLIC AND CLINICAL PICTURE OF HEPATIC ENCEPHALOPATHY IN MAN [Abstract]. (Eng.) Ventura, E.; Zeneroli, M. L.; Rocchi, E.; Santunione, V.; Gibertini, P.; Fiaccadori, F.; *et al.* (Dept. Internal Medicine, Univ. Modena, Modena, Italy). *Digestion* 16(4):362; 1977.

See also, 4443, 4803, 4804, 4809, 4810, 4811, 4812, 4818, 4819, 4827, 4841, 4849, 4862, 4863, 4864, 4906, 4915, 4926, 4936.

LIVER AND BILIARY TRACT

Chronic Hepatitis

4905 IN VITRO MORPHOLOGICAL STUDIES ON ANTIBODY-DEPENDENT NONIMMUNE LYMPHOCYTE-MEDIATED CYTOTOXICITY IN CHRONIC ACTIVE LIVER DISEASE. (Eng.) Kawanishi, H. (Ann Arbor Veterans Admin. Hosp., Ann Arbor, MI 48105). *Am. J. Dig. Dis.* 23(2):97-109; 1978.

To investigate the mechanism of parenchymal cell injury or death in chronic active liver disease (CALD), the killing effect of chronic liver disease sera on target Chang cells, mediated by effector nonimmune lymphocytes (NLy), was sudied from 16 (9 with CALD and 6 with chronic persistent hepatitis) patients using an *in vitro* system of antibody-dependent cellular cytotoxicity (ADCC). NLy destroyed Chang cells in monolayers pretreated with sera from nine CALD patients. Sera from these patients after steroid therapy demonstrated a significant decrease of the cytotoxic action of NLy ($p<0.001$) compared with controls. The target cells treated with sera of 10 normal subjects or patients with chronic persistent hepatitis were only minimally affected. Morphological observations of the cytotoxic action in a CALD serum-treated group showed intimate contact between NLy and the target cells in the areas of the plaques, where large numbers of the target Chang cells were injured and were closely associated with effector NLy. The Chang cells developed cytoplasmic swelling. The surface became ruffled, and intracytoplasmic organelles displayed vesicular degeneration. Thereafter, cell rupture and fragmentation occurred. The sera of patients with CALD appear to possess a membrane reactive factor, presumably antibody, against the surface membrane of Chang cells. This immunological mode of reaction between the effectors and target cells (ADCC) may be important in the perpetuation and pathogenesis of hepatocyte death in CALD.

4906 LYMPHOCYTOTOXICITY TEST AGAINST RABBIT HEPATOCYTES IN CHRONIC LIVER DISEASE.

(Eng.) Facchini, A.; Stefanini, G. F.; Bernardi, M.; Miglio, F.; Gasbarrini, G.; Labo, G. (Istituto di I Clinica Medica e Gastroenterologia, Policlinico S. Orsola, Bologna, Italy). *Gut* 19(3):189-193; 1978.

The cytotoxicity against rabbit liver cells of lymphocytes from the peripheral blood of 71 patients with various liver diseases was studied. The 85 patients with chronic active hepatitis and the 3 patients with acute alcoholic hepatitis showed significantly higher mean values of lymphocytotoxicity ($p<0.001$) compared with patients with chronic persistent hepatitis (n=7), postnecrotic fibrosis and cirrhosis (n=11), Wilson's disease (n=8), and prolonged viral hepatitis (n=7). The mean cytotoxicity of these last groups did not differ significantly from those in 44 controls. In four of six patients with chronic active hepatitis, a significant decrease of lymphocytotoxicity was found after immunosuppressive therapy with p.o. prednisolone ($p<0.05$). A good correlation between the lymphocytotoxicity test and histological signs of activity suggests that a cell-mediated immune aggression is present in this disease.

4907 DIAGNOSIS AND TREATMENT OF CHRONIC ACTIVE HEPATITIS.

(Ger.) Paumgartner, G. (Institut fur Klinische Pharmakologie, Murtenstrasse 35, CH-3010 Bern, Switzerland). *Schweiz. Med. Wochenschr.* 108(4):120-123; 1978.

The diagnosis and therapy of chronic active hepatitis (CAH) are reviewed. Since CAH covers a histologically, biochemically, and clinically heterogeneous group of patients, there is no justification for treating all patients with this diagnosis with corticosteroids. While corticosteroids appear to be indicated in severe forms of CAH (characterized by bridge necroses, multilobular necrosis, cirrhotic transformation, and greatly increased transaminase levels), whether HBsAg-positive or negative, they should not, in general, be administered in mild forms (absence of bridge necroses, slight increase in transaminase levels, no or mild subjective symptoms). In CAH of medium severity, the risk should be carefully weighed against the benefit of the therapy in every individual patient. In HBsAg-negative patients, a therapeutic trial of at least 6 months is worthwhile. In HBsAg-positive patients, corticosteroid therapy should be delayed, because the symptoms tend to disappear spontaneously in 1-2 yr, and the effect of corticosteroids on the course of the disease is not sufficiently known. Once the decision for corticosteroid therapy has been made, 10 mg/day prednisolone and 50 mg/day azathioprine as a maintenance therapy is the treatment of choice. The therapy can be initiated with higher prednisolone doses (e.g., 30 mg/day during the first week, 20 mg/day during the next week, and 15 mg/day for 2 weeks). The prednisolone-azathioprine combination is approximately as effective as 15-20 mg/day prednisolone alone, but is associated with a lower incidence of side-effects. Azathioprine is contraindicated in patients with leukopenia, thrombocytopenia, and hypersensitivity.

4908 TREATMENT OF CHRONIC HEPATITIS. COMPARATIVE STUDY ON THE EFFECTIVENESS OF AZATHIOPRINE AND (+)-CYANIDANOL-3.

(Ger.) Aguilar Reina, J.; de la Santa Lopez, J.; Cuadras Avellana, C. M.; Kern, A. (Postgraduate Medical Sch. of Internal Medicine, Seville, Spain). *Fortschr. Med.* 96(2):75-79; 1978.

Comparative clinical trials were performed with (+)-cyanidanol-3 (C, 3 x 500 mg/day, p.o.) and azathioprine (100 mg/day) in two matching groups of eight patients each with chronic persistent or chronic aggressive hepatitis. The patients were followed up for 6 months. The overall clinical results obtained in the two groups were equivalent. C proved to be more effective than azathioprine in terms of the normalization of the liver function tests (total bilirubin, levels of transaminases, and BSP retention), while azathioprine had a more favorable effect on the reduction of IgG and IgM than did C. While C had no side-effects in the eight patients, the azathioprine therapy had to be suspended temporarily because of leukopenia and/or thrombocytopenia in three of eight patients. The findings indicate the clinical advantages of C over immunosuppressive azathioprine in the treatment of patients with chronic persistent or aggressive hepatitis.

4909 TREATMENT OF HBsAg-POSITIVE CHRONIC ACTIVE HEPATITIS WITH HUMAN FIBROBLAST INTERFERON.

(Eng.) Kingham, J. G. C.; Ganguly, N. K.; Shaari, Z. D.; Mendelson, R.; McGuire, M. J.; Holgate, S. J.; *et al.* (Southampton General Hosp., High Wycombe, Bucks, England). *Gut* 19(2): 91-94; 1978.

The cases of two patients with hepatitis B surface antigen (HBsAg)-positive chronic active hepatitis who were treated with human fibroblast interferon (10^7 U daily for 2 weeks) are presented. Before treatment, both patients had high levels of HBsAg, antibody to hepatitis B core antigen, and DNA-binding antibody in the blood, and one patient had a fourfold rise in serum aspartate aminotransferase (AST). During treatment, there was a striking fall in the core antibody titer and also in the DNA-binding antibody, which has been maintained for several months subsequently. In one patient the initially high AST level fell to normal. No significant adverse effects occurred, and these observations should encourage further trials of fibroblast interferon in hepatitis B treatment.

4910 DISTURBANCES OF THE EXOCRINE FUNCTION OF THE PANCREAS IN PATIENTS WITH CHRONIC HEPATITIS. (Rus.) Geller, L. I.; Ozherel'eva, N. Ia. (Medical Inst., Khabarovsk, USSR). *Klin. Med. (Mosk.)* 56(2):53-59; 1978.

The functional state of the exocrine tissue of the pancreas was studied in 59 patients with chronic hepatitis that developed after acute viral hepatitis. The patients could be divided into two groups: group 1 included 24 patients with mild activity of chronic hepatitis and group 2 included 34 patients with marked activity of chronic hepatitis. The i.v. injection of intestinal hormones (secretin and/or pancreozymin at 1.5 IU/kg) induced the escape of pancreatic enzymes into the blood and, subsequently, into the urine; functional disturbances of the exocrine tissue were more frequent and more pronounced among the patients from group 2. The pancreozymin test showed a marked decrease of secretion of pancreatic amylase, lipase, and trypsin into the duodenum (42.8 ± 8.6 IU, 19.0 ± 2.4 IU, and 28.8 ± 4.8 IU, resp., in group 1; 40.6 ± 8.3 IU, 11.9 ± 2.2 IU, and 16.9 ± 3.3 IU in group 2; 51.5 ± 4.2 IU, 27.1 ± 1.9 IU, and 50.1 ± 5.9 IU in healthy controls).

4911 RADIOIMMUNOASSAY FOR ANTIBODIES TO HUMAN LIVER-SPECIFIC MEMBRANE LIPOPROTEIN (LSP) IN CHRONIC ACTIVE HEPATITIS AND CHRONIC PERSISTENT HEPATITIS [Abstract]. (Eng.) McFarlane, I. G.; Jensen, D.; Eddleston, A. L. W. F.; Williams, R. (King's Coll. Hosp., Medical Sch., London, England). *Digestion* 16(4):355; 1977.

4912 CHRONIC HEPATITIS. (Eng.) Anonymous. (No affiliation given). *Br. Med. J.* 2(6096):1171-1172; 1977.

See also, 4580, 4803, 4804, 4808, 4812, 4818, 4843, 4844, 4887, 4888, 4891, 4897, 4902, 4923, 4926, 4946.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

4913 PREREQUISITES OF ALCOHOLIC LIVER DAMAGE. (Ger.) Thaler, H. (Wilhelminenspital, Montleartstrasse 37, A-1171 Vienna, Austria). *Therapiewoche* 27(38):6580, 6582, 6585, 6587; 1977.

The relationships between the pattern of alcohol consumption and the development of liver cirrhosis are described on the basis of surveys conducted in France. The incidence of liver cirrhosis was found to increase enormously with the increase of the daily alcohol consumption above a critical threshold of 20 g pure alcohol in women, and considerably and steadily in men above a critical threshold of 60 g pure alcohol. Cirrhosis is observed usually after 6-yr chronic alcoholism; its incidence is 50% after 22-yr chronic alcoholism. The danger for the liver is continuous rather than intermittent alcohol consumption. The markedly lower alcohol tolerance of the liver in women may be due to genetic or hormonal factors. Alcohol tolerance is subject to considerable individual variations; there are chronic alcoholics who fail to develop cirrhosis after life-long major alcohol abuse. Cure or arrest of the pathological liver process in subjects with any degree of alcoholic liver damage requires strict abstinence, which cannot be replaced by any dietetic measure or drug treatment.

4914 ALCOHOLIC CIRRHOSIS OF THE LIVER IN THE SCANDINAVIAN COUNTRIES 1961-1974. (Eng.) Svendsen, H. O.; Mosbech, J. (County Hosp., St. Elisabeth, 2300 Copenhagen, Denmark). *Int. J. Epidemiol.* 6(4):345-348; 1977.

The numbers of deaths due to alcoholic liver cirrhosis in Sweden, Norway, Finland, and Denmark from 1961 to 1974 were compared. Mortality from alcoholic cirrhosis increased in Finland and Denmark 10-fold and 5-fold, resp., from 1961 to 1974. The increase was particularly marked since 1968. In Sweden, a threefold increase and in Norway, a doubling of mortality in men was ascribed to alcoholic liver cirrhosis. Mortality from nonalcoholic liver cirrhosis remained practically unchanged during this period. Increases in mortality from liver cirrhosis due to alcohol abuse run parallel with increases in alcohol consumption; the countries with the highest mortality had the highest consumption. The consumption of spirits predominates in Sweden, in Finland spirits and beer, in Denmark beer and wine, and in Norway spirits and beer. Doubling of alcohol consumption in a country was followed by a fourfold increase in the number of alcoholics, and by a fourfold increase in alcohol-induced diseases.

4915 THE CLINICOPATHOLOGICAL FEATURES OF THE ALCOHOLIC LIVER INJURY IN JAPAN AND ITS ETIOLOGICAL RELATIONSHIP TO HEPATITIS B VIRUS.

(Eng.) Inoue, K. (Toyama Medical and Pharmaceutical Sch., Sugitani, Toyama City, 930-01 Japan). *Gastroenterol. Jpn.* 12(3):230-240; 1977.

The symptoms, physical findings, and laboratory tests of 73 patients with a history of excessive drinking (>150 g ethanol/day) were studied to clarify the clinicopathological features of alcoholic liver injury and the effect of hepatitis B virus (HBV) infection on this disease. Liver biopsies were performed on all patients, some more than once, giving 93 specimens. The sera of 53 patients were tested for HBV infection by an immune adherence hemagglutination test or radioimmunoassay for HB surface antigen (HBsAg). Blastogenesis in response to phytohemagglutinin (PHA) was tested in 26 patients and the macrophage migration inhibitory factor (MIF) assay in the presence of HBsAg was carried out in 25 patients. The main symptoms were anorexia (33 patients), general malaise (30), jaundice (19), ascites and vomiting (17), and nausea and vomiting (16). The chief physical findings were hepatomegaly (72 patients), ascites and edema (13), vascular spider (10), palmar erythema (10), and splenomegaly (4). The SGOT and SGPT values were abnormal in 60 and 46 patients, resp. Elevated values for serum bilirubin, alkaline phosphatase, and serum γ-globulin were observed in 30/60, 14/64, and 9/64 patients examined, resp. Histological diagnosis of the biopsy specimens noted 30 cases of wiremesh fibrosis, 11 of hepatic cirrhosis, 9 of fatty liver, 3 of subacute hepatitis (Tisdale), 3 of hemosiderosis, and 37 with nonspecific changes. Serum assays gave positive results for HBsAg, 3/53; anti-HBs, 6/38; anti-HBc, 5/24; and MIF, 6/25. Suppressed response to PHA was noted in 5/26 cases, which indicates but does not confirm the involvement of abnormal cellular immunity. However, low alcoholic hyalin incidence in this study correlates the pathogenesis of alcoholic liver injury with abnormal cellular immunity. The high number of positive assays correlates with the national norm for Japan and at most reflect previous HBV infection, which may modify the clinicopathological features. Histologically, in chronic alcoholics in Japan, the fibrosis of portal tracts frequently extends into the lobule pericellularly, thus forming the wiremesh fibrosis with scanty inflammatory changes. The reasons for the differences between Japan and western countries with respect to the features of cirrhosis have not been clarified.

4916 AMINOPYRINE BREATH TEST IN ALCOHOLIC LIVER DISEASE AND IN PATIENTS ON ENZYME-INDUCING DRUGS.

(Eng.) Lewis, K. O.; Nicholson, G.; Lance, P.; Paton, A. (Dudley Road Hosp., Birmingham B18 7QH, England). *J. Clin. Pathol.* 30(11):1040-1043; 1977.

Liver function was assessed, using the ^{14}C-aminopyrine breath test, in 14 normal subjects, 16 patients with alcoholic cirrhosis, 14 alcoholics without cirrhosis, and 29 patients taking a variety of drugs. The normal value for the breath test was 8.6 ± 1.5%, whereas it was significantly lower (5.1 ± 3.8%) in patients with alcoholic cirrhosis. Higher than normal values were found in some alcoholic patients without cirrhosis and in patients receiving enzyme-inducing drugs, such as phenobarbitone. There was a significant correlation between serum gamma-glutamyltransferase and breath test in these groups ($r=0.61$, $p<0.05$). Some patients with alcoholic cirrhosis may also be capable of enzyme induction.

4917 GLUTAMATE DEHYDROGENASE: A RELIABLE MARKER OF LIVER CELL NECROSIS IN THE ALCOHOLIC.

(Eng.) Van Waes, L.; Lieber, C. S. (Bronx Veterans Admin. Hosp., Bronx, NY). *Br. Med. J.* 2(6101):1508-1510; 1977.

The usefulness of blood enzyme determinations as markers of liver necrosis was tested in 100 alcoholics who underwent biopsy. Mean values of glutamate dehydrogenase (GDH), SGOT, SGPT, ornithine carbamoyltransferase (OCT), and gammaglutamyltranspeptidase (gamma-GTP) tended to rise with increasing liver cell necrosis, though values of SGOT, SGPT, OCT, and gamma-GTP showed considerable overlap between the 32 patients with histologically proved hepatitis and the 68 without. By contrast, GDH values showed virtually no overlap between patients with and without hepatitis, and a value of 2.5 times the normal value discriminated between the two groups. Because of its easy determination and its reliable reflection of liver cell necrosis, the GDH concentration should be estimated routinely in alcoholic patients.

4918 GAMMA-GLUTAMYLTRANSPEPTIDASE IN THE HEPATIC ENZYME PROFILE OF THE ALCOHOLIC.

(Fre.) Malarme, M.; Dumont, A.; Wettendorff, P.; Van Melsen, A.; Delcourt, A. (Service de Medecine, IMC d'Ixelles, 63 rue J. Paquot, B-1050 Bruxelles, Belgium). *Acta Gastroenterol. Belg.* 40(7/8):293-303; 1977.

A retrospective study was made on serum levels of 10 enzymes in patients with varying degrees of chronic alcoholism. There were no significant differences between 45 patients who abstained totally (group I) and 45 patients who consumed less than 100 g ethanol/day (group 2). However, 80 patients who drank more than 100 g ethanol/day (group 3, 35 patients who had liver biopsies; group 4, 45 without liver biopsies) had significantly elevated levels of γ-glutamyl transpeptidase (γ-GT), leucine amino peptidase (LAP), lactic dehydrogenase (LDH), and 5'-nucleotidase (5'Nase, $p<0.001$ for group 4 patients). Group 3 patients had higher levels of γ-GT and LAP than group 4 patients ($p<0.01$), and they were elevated more frequently than the other enzymes in both groups 3 and 4: 71.1% and 47.5%, resp., in group 4 patients and 82.8% and 71.8%, resp., in group 3 patients. There was a statistically significant correlation ($r=0.8$) between γ-GT and LAP in groups 3 and 4. No correlation was found between γ-GT and 5'Nase or AP levels. Increased γ-GT levels without the corresponding increase in LAP levels were not indicative of the degree of alcoholism, but of various other pathologies. The close correlation between γ-GT and LAP levels in chronic alcoholics suggests cellular impairment rather than enzymatic induction for the observed enzymatic alterations.

4919 SERUM ZINC AND SERUM COPPER AND INDICES OF DRUG METABOLISM IN ALCOHOLICS. (Eng.)

Hartoma, T. R.; Sotaniemi, E. A.; Pelkonen, O.; Ahlqvist, J. (Aurora Hosp., Helsinki, Finland). *Eur. J. Clin. Pharmacol.* 12(2):147-151; 1977.

Serum zinc and copper levels were studied in relation to *in vitro* and *in vivo* drug metabolism in 25 alcoholics, some of whom had various liver diseases. Serum zinc was elevated in the six alcoholics with normal liver (160 ± 38.2 μg/100 ml) and in the seven with fatty liver (140.5 ± 30.7 μg/100 ml) and was low in the six with alcoholic hepatitis (105 ± 17.9 μg/ml) or cirrhosis (84.0 ± 129 μg/100 ml). There was a significant positive correlation ($r=0.69$, $p<0.001$) between serum zinc and cytochrome P-450 content of liver biopsies. The relationship between zinc and antipyrine half-life was significant and nonlinear ($p<0.001$). Serum copper level was elevated in all the alcoholics (203.9 ± 46.0 μg/100 ml versus 149.6 ± 25.7 μg/100 ml in controls), and no significant relationship was found between copper and drug metabolism in alcoholics. The findings suggest parallelism between changes in serum zinc and indices of drug metabolism in alcoholics.

4920 TREATMENT OF ALCOHOLIC HEPATITIS WITH ENCEPHALOPATHY: COMPARISON OF PREDNISOLONE WITH CALORIC SUPPLEMENTS. (Eng.)

Lesesne, H. R.; Bozymski, E. M.; Fallon, H. J. (North Carolina Memorial Hosp., Chapel Hill, NC 27514). *Gastroenterology* 74(2, Part 1):169-173; 1978.

The results of prednisolone therapy in alcoholic hepatitis were compared with those of a regimen of 1,600 cal/day without prednisolone in 14 patients with alcoholic hepatitis and encephalopathy. All seven patients on caloric supplementation and two of seven given prednisolone died ($p<0.01$). These results suggest that prednisolone therapy reduced the mortality of those patients with alcoholic hepatitis and hepatic encephalopathy. This effect does not appear to be related to total caloric intake.

4921 BLOOD POLYMORPHONUCLEAR DYSFUNCTION IN PATIENTS WITH ALCOHOLIC CIRRHOSIS. (Eng.)

Feliu, E.; Gougerot, M. A.; Hakim, J.; Cramer, E.; Auclair, C.; Rueff, B.; *et al.* (Hopital Bichat, 170 Boulevard Ney, 75877 Paris Cedex 18, France). *Eur. J. Clin. Invest.* 7(6):571-577; 1977.

Polymorphonuclear leukocyte function was investigated in 20 patients with alcoholic cirrhosis and 3 patients with cryptogenic cirrhosis. Bacterial ingestion, oxygen-dependent bactericidal capacity, and chemotactic response were measured. Serum-dependent abnormalities were common; they included deficiencies of ingestion and of all subsequent oxygen-dependent metabolic events (3 patients), all oxygen-dependent metabolic events (1 patient), cytochrome c reduction and iodination deficiencies (6 patients), isolated cytochrome c reduction deficiency (10 patients), and chemotactic deficiencies (14/18 patients). Serum-independent abnormalities were much less common; they included increased ingestion rate (4 patients), decreased stimulated reduction of nitroblue tetrazolium (3 patients), and decreased myeloperoxidase content (8 patients). Polymorphonuclear leukocyte abnormalities are frequent in cirrhosis and may account in part for increased susceptibility to infection in that disease.

4922 CHOLESTASIS IN ACUTE ALCOHOLIC LIVER DISEASE. (Eng.)

Glover, S. C.; Brunt, P. W.; McPhie, J. L. (Royal Infirmary, Foresterhill, Aberdeen AB9 2ZB, Scotland). *Lancet* 2(8052/3):1305-1306; 1977.

Ten patients in a series of 108 patients with alcoholic liver disease, who presented with cholestasis associated with noncirrhotic alcoholic liver disease and without evidence of extrahepatic biliary obstruction, are reviewed. In seven patients, liver histology and the associated conditions presenting as cholestasis were heterogeneous. However, in three patients who had been drinking excessively before cholestatic jaundice developed, cholestasis was a major feature of liver histology. The term acute alcoholic cholestasis is suggested for this apparently distinct syndrome of cholestatic jaundice in the absence of hepatitis.

4923 SERUM PROLACTIN IN LIVER DISEASE AND ITS RELATIONSHIP TO GYNAECOMASTIA. (Eng.)

Morgan, M. Y.; Jakobovits, A. W.; Gore, M. B. R.; Wills, M. R.; Sherlock, S. (Royal Free Hosp., London, England). *Gut* 19(3):170-174; 1978.

To determine whether prolactin plays a role in endocrine changes observed in chronic liver disease, serum immunoreactive prolactin was measured in 150 patients with liver diseases of varying etiology and severity and in 45 controls. The upper limit of the reference range for serum prolactin was 331 mU/l. Eighteen patients with liver disease (12%) had unexplained hyperprolactinemia. No relationship existed between the prolactin value and the sex of the patient, the etiology of the liver disease, the severity of the liver disease, or the presence of gynecomastia. The cause of the hyperprolactinemia in patients with liver disease and its clinical implications need further investigation.

4924 CLINICAL AND PATHOLOGICAL STUDY OF NONCIRRHOTIC ACUTE ALCOHOLIC HEPATITIS [Abstract]. (Eng.) Karasawa, T. (Nihon Univ. Sch. Medicine, Tokyo, Japan). *Gastroenterol. Jpn.* 12(4): 342; 1977.

4925 PATHOLOGY OF ALCOHOLIC LIVER INJURY IN JAPAN [Abstract]. (Eng.) Okudaira, M. (Sch. Medicine, Kitasato Univ., Kanagawa, Japan). *Gastroenterol. Jpn.* 12(4):340; 1977.

See also, 4435, 4478, 4480, 4481, 4808, 4809, 4814, 4822, 4831, 4906, 4938.

LIVER AND BILIARY TRACT

Cirrhosis

4926 THREE-DIMENSIONAL MORPHOLOGY OF THE LIVER IN CIRRHOSIS AND RELATED DISEASES. (Eng.) Takahashi, T. (Tohoku Univ. Sch. Medicine, Seiryomachi, Sendai, Japan). *Virchows Arch. [Pathol. Anat.]* 377(2):97-110; 1978.

Livers removed at autopsy from three patients with cirrhosis, one with subacute hepatitis, and one with chronic persistent hepatitis were subjected to three-dimensional graphic reconstruction of nodules, interstitial septa, and blood vessels from serial histologic sections. In all cases of cirrhosis, adjacent cirrhotic nodules were connected to form a nodular network, in spite of their apparent separation in histologic sections. The nodules were linked in the form of chains with abundant anastomoses, and the network was "conjugate" with the intrahepatic vascular tree, as revealed by its close relationship to blood vessels. A parenchymal network of the same type was also found in the livers with subacute or chronic hepatitis, suggesting that this type of structure is common to cirrhosis and its precursor lesions and represents the geometrical configuration of hepatic parenchyma surviving zonal hepatic necrosis.

4927 PERITONEOVENOUS (LEVEEN) SHUNT: CONTROL OF RENIN-ALDOSTERONE SYSTEM IN CIRRHOTIC ASCITES. (Eng.) Witte, M. H.; Witte, C. L.; Jacobs, S.; Kut, R. (Arizona Medical Center, 1501 N. Campbell Ave., Tucson, AZ 85724). *JAMA* 239(1):31-33; 1978.

Because of the unusual clinical course of a patient with hepatic cirrhosis, refractory ascites, and hepatorenal syndrome, the complex interrelationships between massive ascites, renin-aldosterone activity, and renal and hepatic function before and after placement of a peritoneojugular vein (LeVeen) shunt could be examined. When the shunt was functioning, renin-aldosterone production was suppressed, the hepatorenal syndrome was reversed, and ascites remitted. These data suggest that the hyperreninemia, hyperaldosteronism, and functional renal abnormalities of this disorder are potentially reversible and arise primarily from the imbalance between formation and drainage of hepatosplanchnic lymph rather than from hepatocellular dysfunction, lowered plasma oncotic pressure, or portal hypertension.

4928 RELAPSING POLYRADICULITIS AFTER PORTOCAVAL ANASTOMOSIS. (Eng.) Vital, C.; Staeffen, J.; Series, C.; Terme, R.; Brechenmacher, C.; Pachebat, B. (Centre de Microscopie Electronique, 146, rue Leo-Saignat, F-33000 Bordeaux, France). *Eur. Neurol.* 17(2):108-116; 1978.

A case of relapsing polyneuritis in a 48-yr-old woman with alcoholic cirrhosis and a surgical splenorenal shunt is reported. Ultrastructural study of the nerve biopsy showed widespread segmental demyelinization with total myelin breakdown in most fibers; some Schwann cells were invaded by mononuclear cell processes. Such histological changes are characteristic of the Guillain-Barre syndrome. Alcoholism and diabetes were probably not the causative factors of the nerve damage. Toxic metabolites, such as those that cause portasystemic encephalopathy, were also present in this patient may have played a role in the nerve damage.

4929 EFFECT OF PORTACAVAL SHUNT ON SERUM BILE ACID CONCENTRATION IN PATIENTS WITH CIRRHOSIS. (Eng.) Poupon, R. E.; Poupon, R. Y.; Grosdemouge, M. L.; Erlinger, S. (Hopital Beaujon, F-92118 Clichy Cedex, France). *Digestion* 16(1/2): 138-145; 1977.

The influence of portacaval shunt (PCS) on serum bile acid concentration was examined retrospectively in 47 cirrhotic patients. Cirrhotic patients with PCS had a significantly higher serum bile acid concentration than did cirrhotic patients without

PCS regardless of the duration between the diagnosis and the time of measurement ($p<0.001$). The serum bile acid concentration was significantly higher 3 to 12 months after PCS (67.90 ± 15.90 μM, $p<0.001$) and 12 months or more after PCS (94.11 ± 33.86 μM, $p<0.001$) than before the shunt (18.98 ± 13.62 μM). The mean concentration 12 months or more after PCS was significantly higher than that found 3 to 12 months after shunt ($p<0.02$). This progressive increase in serum bile acid concentration may indicate a deterioration of hepatic function in shunted patients.

4930 A PATIENT WITH RECURRENT HEPATIC ENCEPHALOPATHY AND CHRONIC RENAL FAILURE TREATED SUCCESSFULLY WITH LONG-TERM HEMODIALYSIS.

(Eng.) Kaneda, H.; Haruyama, T.; Chiba, S.; Sugai, Y.; Hirasawa, T.; Takeuchi, M.; *et al.* (Iwaki-Kyoritsu General Hosp., Iwaki, Japan). *Tohoku J. Exp. Med.* 123(3):227-234; 1977.

The case of a 38-yr-old man with chronic recurrent hepatic encephalopathy due to liver cirrhosis complicated by chronic renal failure who was maintained well by regular hemodialysis for 14 months is presented. Only four episodes of hepatic encephalopathy occurred in this period. Each of four episodes of disturbed consciousness was accompanied by slightly elevated blood ammonia levels. Energetic serial dialysis for 5 to 7 days was necessary for its recovery. It is concluded that hemodialysis is an effective treatment for recurrent hepatic encephalopathy.

4931 RENAL BLOOD FLOW IN CIRRHOSIS: RELATION TO SYSTEMIC AND PORTAL HAEMODYNAMICS AND LIVER FUNCTION.

(Eng.) Ring-Larsen, H. (Rigshospitalet, 9 Blegdamsvej, DK-2100 Copenhagen O, Denmark). *Scand. J. Clin. Lab. Invest.* 37(7):635-642; 1977.

To investigate the mechanism precipitating changes in renal blood flow (RBF) in cirrhosis, the RBF was measured by the ^{133}Xe-washout method in 70 patients with this disease. The average RBF in controls was 3.72 ml/g/min compared with 2.34 in the patients without ascites, 1.82 in the decompensated patients, 1.47 in the patients with azotemia, and 1.13 in the patients with additional oliguria. The RBF was not significantly correlated to changes in the systemic or portal hemodynamics. Likewise it was not correlated to any biochemical test of liver function except the serum albumin concentration ($r=+0.48$, $p<0.01$). It is concluded that a reduction in RBF in cirrhosis is frequently present before sodium and water retention is clinically evident and before there is laboratory proof of impairment of renal function. A subnormal serum albumin concentration may be one factor among several leading to renal hypoperfusion in cirrhosis.

4932 CLINICAL VALUE OF HEPATIC VEIN CATHETERIZATION: IMPROVED PRACABILITY [sic] BY BALLOON CATHETER TECHNIQUE.

(Eng.) Butzow, G. H.; Novak, D. (Medizinische Klinik der Universitat Hamburg, Martinistr. 52, D-2000 Hamburg 20, W. Germany). *Gastrointest. Radiol.* 2(2):153-161; 1977.

Experiences in venographic and hemodynamic investigations of the liver outflow tract are described. Hepatic venous pressure measurements were attempted in 100 patients with the balloon catheter technique. In 32 of these cases, hepatic venous pressure measurements and hepatic occlusion phlebography were combined. In five cases it was impossible to insert one of the catheters into a liver vein ostium. In the 63 patients with liver cirrhosis, a significant ($p<0.001$) elevation of hepatic venous pressure was found. A decrease of the pressure gradient was seen after portacaval and splenorenal shunt operations. Hepatic occlusion phlebography showed alterations of hepatic veins only in patients with cirrhosis. There was a rough correlation between pressure gradients and the extent of changes in the liver veins. Hepatic occlusion phlebography in patients who had undergone shunt procedures demonstrated collaterals of three different types: (1) tiny vessels in the gallbladder region, (2) recanalization of the umbilical vein, and (3) development of large portosplanchnic bridging anastomoses. In patients with portacaval shunt, missing collaterals or development of only tiny vessels in the gallbladder were associated with markedly lower pressure gradients (1, 4, 5, and 8 mm Hg) compared with large collaterals found in patients with large pressure gradients (12, 13, 16, and 25 mm Hg), which suggests that the development of large collaterals depends upon augmented intrahepatic pressure due to increased arterial influx and marked outflow obstruction. Proximal occlusion venography is a valuable method to demonstrate the direction of portal flow and the patency of an anastomosis due to its clear and contrast-rich opacification and minimum risk to the patient.

4933 SELECTION OF OPERATION IN PATIENTS WITH BLEEDING ESOPHAGEAL VARICES.

(Eng.) Langer, B.; Patel, S. C.; Stone, R. M.; Colapinto, R. F.; Phillips, M. J.; Fisher, M. M. (Toronto General Hosp., Toronto, Ontario M5G 1L7, Canada). *Can. Med. Assoc. J.* 118(4):369-372; 1978.

The results of surgical treatment of bleeding esophageal varices over an 8-yr period in 155 patients are reviewed. Primary treatment of bleeding was conservative, with the i.v. administration of vasopressin and balloon tamponade. Emergency operations were carried out after 48 hr in 63 patients with persistent bleeding who were surgical candidates. Operative mortality was higher in this group (40%) than in the 39 patients undergoing elective surgery or in the 53 patients who underwent urgent operations (each 10%). Postoperative encephalopathy occurred in 35% of patients and was correlated closely to late death after establishment of a shunt. In an uncontrolled trial, 86 patients underwent a portacaval shunt, 32 underwent a distal splenorenal shunt, and 13 underwent a mesocaval shunt; the operative mortality rates were 23%, 16%, and 31%, resp. Postoperative encephalopathy occurred in 50%, 7%, and 44%, resp., and late death occurred in 33%, 11%, and 11%, resp. A controlled trial in 22 patients who underwent a distal splenorenal shunt and 21 who underwent a portacaval shunt showed that the operative mortality rates were 18% and 0%, resp. Postoperative encephalopathy occurred in 6% and 29%, resp., and late death occurred in 11% and 14%, resp. These results indicate that the distal splenorenal shunt is associated with a lower rate of postoperative encephalopathy.

4934 INCREASED TRANSCAPILLARY ESCAPE RATE OF ALBUMIN IN PATIENTS WITH CIRRHOSIS OF THE LIVER. (Eng.) Parving, H. H.; Ranek, L.; Lassen, N. A. (Bispebjerg Hosp., Bispebjerg Bakke 23, DK-2400, Copenhagen NV, Denmark). *Scand. J. Clin. Lab. Invest.* 37(7):643-648; 1977.

The transcapillary escape rate of albumin, i.e., the fraction of the intravascular mass of albumin that passes to the extravascular space per unit time, was determined from the disappearance of i.v. injected ^{125}I-labeled human serum albumin during the first 60 min after injection in nine patients with liver cirrhosis. Six patients had ascites. The wedged hepatic venous pressure or splenic pulp pressure ranged from 20 to 30 mm Hg (mean 26 mm Hg). The plasma albumin concentration was low, but plasma volume was slightly elevated, and thus the intravascular mass of albumin was only moderately reduced. The transcapillary escape rate of albumin was significantly elevated in all patients (mean 10.2%/hr, range 8.8 to 12.3%/hr), in comparison with the values of 28 normal subjects (5.4%/hr, range 3.5-7.2%/hr). These results can best be explained by increased filtration out of the vessels in the portal system, due to the increased portal venous pressure. The increased transcapillary escape rate of albumin probably contributes to the formation of edema and ascitic fluid.

4935 POOL SIZE, SYNTHESIS, AND TURNOVER OF SULFATED AND NONSULFATED CHOLIC ACID AND CHENODEOXYCHOLIC ACID IN PATIENTS WITH CIRRHOSIS OF THE LIVER. (Eng.) Stiehl, A.; Ast, E.; Czygan, P.; Frohling, W.; Raedsch, R.; Kommerell, B. (Univ. Heidelberg, Dept. Medicine, 6900 Heidelberg, Bergheimerstr. 58, W. Germany). *Gastroenterology* 74(3):572-577; 1978.

Because sulfation of bile acids is a quantitatively important pathway of bile acid metabolism in patients with liver disease, the kinetics of sulfated ^{14}C-cholic and ^{14}C-chenodeoxycholic acids were studied and compared with the kinetics of unsulfated ^{14}C-cholic and ^{14}C-chenodeoxycholic acids. In five patients with liver cirrhosis, sulfated and unsulfated ^{14}C-cholic and ^{14}C-chenodeoxycholic acids were administered i.v. and the specific activity curves were determined. Specific activities declined exponentially, and pool sizes, synthesis rates, and turnover rates of bile acids were calculated on the basis of a one-pool system. The mean biological half-life of cholic acid was 4.3 ± 1.6 days and of chenodeoxycholic acid was 2.8 ± 1.2 days. The half-life of cholic acid sulfate was 0.7 ± 0.5 day and of chenodeoxycholic acid sulfate was 0.8 ± 0.5 day. The pool size of cholic acid was 513 ± 103 mg; of chenodeoxycholic acid, 477 ± 77 mg; of cholic acid sulfate, 4.7 ± 1.0 mg; and of chenodeoxycholic acid sulfate, 38.7 ± 4.0 mg. The daily synthesis of cholic acid was 90 ± 14 mg; of chenodeoxycholic acid, 118 ± 6 mg; of cholic acid sulfate, 7.2 ± 2.1 mg; and of chenodeoxycholic acid sulfate was 32.6 ± 3.2 mg. The data indicate that sulfate esters of bile acids are excreted more rapidly than are unsulfated bile acids. More than one-fourth of the chenodeoxycholic acid but less than one-tenth of the cholic acid formed was sulfated. The preferential sulfation of chenodeoxycholic acid is responsible for the more rapid turnover of chenodeoxycholic acid in comparison to cholic acid. Sulfation enhances the excretion and thereby prevents the accumulation of hepatotoxic concentrations of chenodeoxycholic acid in patients with cirrhosis.

4936 SERUM PROTEINS IN HEPATIC DISEASE. (Eng.) Teloh, H. A. (Holy Cross Hosp., Ft. Lauderdale, FL 33307). *Ann. Clin. Lab. Sci.* 8(2):127-129; 1978.

The serum protein changes occurring in liver disease associated with parenchymal damage are described. Characteristically, there is a decrease in serum albumin and an increase in gamma globulin levels. Among 400 unselected patients with hepatic cirrhosis, abnormal serum electrophoretic patterns were seen in 78.2% patients with alcoholic cirrhosis, 96.3% with active chronic hepatitis, and 56% with hemochromatosis. Beta-gamma bridging (an abnormal band between the beta and gamma globulins) in the electrophoretogram is highly characteristic of alcoholic cirrhosis. Variation of alpha 1, alpha 2, and beta fractions is inconstant and is not of great diagnostic or prognostic value. The increase in the gamma fraction is polyclonal (due first to an increase in IgM followed by an increase in IgG), nonspecific, and not of diagnostic value in viral hepatitis. Elevation of the IgA fraction is not as constant or prominent.

4937 CIRCULATING IMMUNE COMPLEXES AND COMPLEMENT ACTIVATION IN PRIMARY BILIARY CIRRHOSIS. (Eng.) Wands, J. R.; Dienstag, J. L.; Bhan, A. K.; Feller, E. R.; Isselbacher, K. J. (Massachusetts General Hosp., Boston, MA 02114). *N. Engl. Med. J.* 298(5):233-237; 1978.

Twenty patients with primary biliary cirrhosis and seven controls with extrahepatic biliary obstruction were examined for the presence of circulating immune complexes. Serologic evidence of alternate complement-pathway activation had been found in 8 of the 20. Immune complexes were isolated by cryoprecipitation from serum and measured directly by the sensitive Raji-cell radioimmunoassay. Cryoproteins, found in high concentrations in 90% of the patients with cirrhosis but undetectable in the controls, were composed of IgM (60%), IgG-IgM (25%), and IgA-IgM (5%), and were capable of activating the complement system *in vitro*. Immune complexes detected by the Raji assay were found in 95% of the patients with cirrhosis and circulated in exceedingly high concentrations (474 μg/ml; range, 16.2-2,192) but were absent in the controls. Furthermore, the alternate complement pathway was activated in eight cirrhotic patients. These complement-fixing immune complexes differ from immune complexes isolated in other types of liver diseases and may be important in the pathogenesis of primary biliary cirrhosis.

4938 THYROID FUNCTION AND THYROID REGULATION IN EUTHYROID MEN WITH CHRONIC LIVER DISEASE: EVIDENCE OF MULTIPLE ABNORMALITIES. (Eng.)

Green, J. R. B.; Snitcher, E. J.; Mowat, N. A. G.; Ekins, R. P.; Rees, L. H.; Dawson, A. M. (St. Bartholomew's Hosp., London EC1A 7BE, England). *Clin. Endocrinol.* 7(6):453-461; 1977.

To clarify the role of the liver in the extrathyroidal conversion of thyroxine (T4) to triiodothyronine (T3), the total and free serum T4 and T3, basal serum thyrotrophin (TSH), and the serum TSH response to a standard i.v. dose of thyrotrophin releasing hormone (TRH) were measured in 15 men with liver cirrhosis and in 8 alcoholic men with fatty liver change. All patients were clinically euthyroid. In the cirrhotics, total T4 and free T4 (FT4) concentrations were normal as were free T3 (FT3) concentrations, but total T3 concentrations were significantly reduced in the cirrhotics ($p<0.005$), and basal TSH concentrations were significantly higher than normal ($p<0.01$). Alcoholics with fatty liver change had normal basal TSH concentrations and normal total and free thyroid hormone concentrations apart from reduced FT4 ($p<0.01$). Correlation of thyroid function tests with liver function (serum albumin concentration) showed significant positive correlations for serum albumin with both total T3 and FT3 and significant negative correlations with both FT4 and basal TSH. Nine of 15 cirrhotics had an abnormal serum TSH response to TRH, the commonest abnormal pattern being a delayed response (7 patients). Three of eight alcoholics with fatty liver change also had an abnormal TSH response to TRH. These findings not only show complex disturbances in hypothalamic-pituitary-thyroid relationships in chronic liver disease but also provide indirect evidence of reduced extrathyroidal conversion of T4 to T3.

4939 EXAGGERATED NATRIURETIC RESPONSE TO VOLUME EXPANSION IN PATIENTS WITH PRIMARY BILIARY CIRRHOSIS. (Eng.)

Chaimovitz, C.; Rochman, J.; Eidelman, S.; Better, O. S. (Rambam Hosp., Haifa, Israel). *Am. J. Med. Sci.* 274(2):173-178; 1977.

To clarify the observation that fluid retention and ascites are frequent in patients with Laennec's cirrhosis but rare in patients with primary biliary cirrhosis (PBC), renal handling of sodium was studied during extracellular volume expansion (ECVE) and maximal suppression of antidiuretic hormone in five patients with PBC. These PBC patients were compared with two control populations: five edema-free patients with Laennec's cirrhosis and nine healthy volunteers. The natriuretic and diuretic response to ECVE was significantly greater in the patients with PBC as compared with the two control groups. The glomerular filtration rate (GFR, V/GFR x 100) averaged 28.8 ± 3.9 ml/min in PBC patients, which was significantly higher than the 17.6 ± 5.9 ml/min in Laennec's cirrhosis and 21.2 ± 2.4 ml/min in the normal controls ($p<0.001$). Sodium clearance was 8.7 ± 1.9 ml/min in the PBC patients, 3.5 ± 1.2 ml/min in Laennec's cirrhosis, and 4.2 ± 1.4 ml/min in controls ($p<0.001$). The rate of urinary sodium excretion was 1,074 ± 253 μEq/min in PBC and 475 ± 150 μEq/min in Laennec's cirrhosis ($p<0.001$); the naturesis in normal controls was 743 ± 414 μEq/min, which was not significantly different from that in PBC. Water clearance for given rates of urine flow were similar in PBC patients as compared with normals. The data suggest that a supranormal rejection of sodium at the proximal tubule in response to ECVE underlies the exaggerated natriuresis of PBC. The augmented elimination of salt during ECVE in patients with PBC may explain the rarity of ascites and edema in this variety of cirrhosis.

4940 COMPARISON BETWEEN REINFUSION OF CONCENTRATED ASCITIC FLUID (RHODIASCIT) PLUS DIURETICS AND DIURETIC TREATMENT IN ASCITIC CIRRHOSIS: A RANDOMIZED CONTROLLED TRIAL. (Eng.)

Maniscalco, E.; Rinaldi, F.; Cottone, M.; DiFranco, C.; Filippazzo, G.; Pagliaro, L.; *et al.* (Ospedale V. Cervello, Via Trabucco 180, Palermo, Italy). *Rend. Gastroenterol.* 9(3):199-201; 1977.

A single reinfusion of concentrated (3x) ascitic fluid (Rhodiascit, 250-300 ml/hr) in 18 cirrhotic patients was compared with conventional diuretic treatment (spironolactone, 300-400 mg/day plus furosemide, 20-40 mg/day on alternate days until clinical disappearance of the ascites, followed by 100-150 mg/day of spironolactone and 20-40 mg/day, 2x/week of furosemide) in 16 cirrhotic patients to assess the usefulness of the first technique. Patients were randomly assigned to the two treatment groups. Patients in the first group recovered more rapidly (8 ascites-free compared to none in the latter group at the end of the first week); at discharge (30-35 days after beginning of treatment), 11/18 patients in the first group and 8/16 patients in the latter group were ascites-free. However, long-term follow-up (1 yr) showed that there was no significant difference between the two groups with regard to recurrence rate or survival rate. The technique is useful primarily to increase the speed of recovery.

4941 ACANTHOCYTOSIS IN CIRRHOSIS. REPORT OF FOUR CASES AND REVIEW OF THE LITERATURE. (Fre.)

Gisselbrecht, C.; Metreau, J. M.; Dhumeaux, D.; Dreyfus, B. (Hopital Henri-Mondor, F 94010 Creteil, France). *Gastroenterol. Clin. Biol.* 1(8/9):621-628; 1977.

Acanthocytosis associated with alcoholic cirrhosis and severe hepatocellular failure is described in four new cases and recent literature on the subject is reviewed. The acanthocytes, which comprised 20-100% of all RBC in these patients, could be identified and differentiated from echinocytes by phase contrast microscopy of fresh blood preparations. Hemolysis varied from 2.4 to 4.8% of total RBC mass per day. ^{51}Cr-tagged RBC from both auto- and allotransfusions had a half-life of 12.5 to 19 days, compared to normal values of 26 to 33 days. The high ratio of free cholesterol/phospholipids in the plasma and, consequently, in the RBC membranes, presumably weakens the RBC, which are then further distorted into acanthocytes in the spleen. The patients' survival was less than 1 yr, and death was generally caused by hepatic failure rather than hyperhemolysis. Splenectomy will suppress the hemolysis, but this surgery can rarely be attempted in these high-risk patients.

4942 α-FETOPROTEIN SCREENING IN PATIENTS WITH IDIOPATHIC HEMOCHROMATOSIS AND LIVER CIRRHOSIS. (Eng.) Chayvialle, J. A. P.; Brissot, P.; Pelletier, M. J.; Hita de Nercy, Y.; Lambert, R.; Bourel, M. (Hopital Edouard-Herriot, 69374 Lyon Cedex 2, France). *Digestion* 16(1/2):118-127; 1977.

To assess the diagnostic value of α-fetoprotein in malignant hepatoma, the serum α-fetoprotein level was measured by radioimmunoassay in 200 patients when admitted to hospital, 63 with idiopathic hemochromatosis and 137 with liver cirrhosis. In addition, repeated controls were performed in 19 subjects of each group for a mean period of 11 months (range 3-18 months). Elevated α-fetoprotein levels were observed initially or during the study period in 15 patients, a malignant liver tumor being demonstrated in 12. In four of these patients, the abnormal α-fetoprotein concentration was the clue to the diagnosis of an unsuspected malignant hepatoma, but in none of these cases could the tumor be resected. The results indicate that screening the serum α-fetoprotein level may contribute to the detection of malignant hepatoma in high-risk clinical groups.

4943 THE EFFECT OF GLUCOSE ORAL ADMINISTRATION ON HYPERAMMONEMIA IN CIRRHOTICS. (Eng.) Schlienger, J. L.; Imler, M. (Laboratoire de Pathologie Interne et Experimentale de la Clinique Medicale B, Universite Louis Pasteur, 67005 Strasbourg Cedex, France). *Clin. Chim. Acta* 82(1/2):61-67; 1978.

To investigate the controverted effect of glucose on hyperammonemia, the diet of eight advanced cirrhotics was supplemented hourly, between 9 a.m. and 5 p.m., with 20 g of p.o. glucose. Plasma insulin and arterial and median cubital venous ammonia levels were measured hourly, and the results were compared to those of a control test performed in the same patients without glucose supplementation. In the control test, the lunch (protein meal) induced an identical rise in arterial and venous ammonia levels (+40 ± 3 and +36 ± 5 μg/100 ml, resp.). With glucose supplementation, plasma insulin rose significantly ($p<0.02$) and the arterial ammonia increase produced by lunch (+42 ± 3 μg/100 ml) did not differ from that observed in the control test; however, the rise in venous ammonemia was lower (+12 ± 4 μg/100 ml, $p<0.01$) with a significant increase in arteriovenous ammonia difference ($p<0.01$). These results suggest that p.o. glucose administration increases the peripheral muscular ammonia uptake through a mechanism that remains to be elucidated but which is inefficient for arterial hyperammonemia.

4944 HAEMODYNAMIC STUDIES IN VINYL CHLORIDE MONOMER WORKERS WITH PORTAL HYPERTENSION [Abstract]. (Eng.) Blendis, L. M.; Smith, P. M.; Lawrie, B. W.; Stephens, M. R.; Evans, W. D. (Welsh Natl. Sch. Medicine, Cardiff, Wales). *Gut* 18(5): A400-A401; 1977.

4945 KINETICS OF ORAL AND INTRAVENOUS RADIOCOPPER IN NORMAL SUBJECTS AND PATIENTS WITH PRIMARY BILIARY CIRRHOSIS [Abstract]. (Eng.) Vierling, J. M.; Rumble, W. F.; Aamodt, R. L.; Shrager, R.; Berman, M. D.; Jones, E. A. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Bethesda, MD). *Gastroenterology* 72(5, Part 2): 1185; 1977.

4946 COMPARTMENTAL ANALYSIS OF HEPATIC RETICULOENDOTHELIAL (HRE) CLEARANCE IN CHRONIC LIVER DISEASE [Abstract]. (Eng.) Vierling, J. M.; Jaffe, C. J.; Lawley, T. J.; Frank, M. M.; Jones, E. A. (Natl. Inst. Arthritis, Metabolism, Digestive Diseases, Bethesda, MD). *Gastroenterology* 72(5, Part 2):1183; 1977.

4947 PORTAL HYPERTENSION AND BLEEDING ESOPHAGEAL AND GASTRIC VARICES: A SURGICAL APPROACH TO TREATMENT. (Eng.) Ellis, P. D. (Indiana Univ. Sch. Nursing, 1100 W. Michigan St., Indianapolis, IN 46202). *Heart Lung* 6(5):791-798; 1977.

4948 PRIMARY BILIARY CIRRHOSIS WITH UNUSUAL VASCULAR SKIN CHANGES. (Eng.) Harman, R. R. M. (Weston-super-Mare General Hosp., England). *Br. J. Dermatol.* 97(Suppl. 15):62-65; 1977.

4949 SPONTANEOUS PERITONITIS OF CIRRHOSIS DUE TO Listeria monocytogenes. (Eng.) Rheingold, O. J.; Chiprut, R. O.; Dickinson, G. M.; Schiff, E. R. (Veterans Admin. Hosp., Miami, FL 33125). *Ann. Intern. Med.* 87(4):455-456; 1977.

4950 BLEEDING MUCOSAL LESIONS IN THE UPPER GASTROINTESTINAL TRACTS OF PATIENTS WITH OESOPHAGEAL VARICES AND HEPATIC CIRRHOSIS. (Eng.)

Hislop, I. G.; Hall, P.; Grant, A. K. (Queen Elizabeth Hosp., Woodville Rd., Woodville, South Australia 5011, Australia). *Aust. N.Z. J. Surg.* 46(3):202-205; 1976.

4951 COPPER TOXICITY IN PRIMARY BILIARY CIRRHOSIS [Letter to Editor]. (Eng.) Scott, L. D.; Dickson, E. R.; Owen, C. A. (Univ. Texas Medical Sch., Houston, TX 77025). *Gastroenterology* 74(2, Part 1):333-334; 1978.

4952 ZINC INGESTION IN CIRRHOTIC PATIENTS [Abstract]. (Eng.) Sullivan, J. F.; Jetton, M.; Burch, R. E. (Dept. Medicine, Creighton Univ., Omaha, NB). *Am. J. Clin. Nutr.* 31(4):718; 1978.

See also, 4481, 4588, 4600, 4603, 4614, 4660, 4714, 4719, 4803, 4804, 4806, 4809, 4811, 4814, 4826, 4841, 4843, 4864, 4887, 4890, 4903, 4904, 4906, 4923, 5000.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

4953 INTRAOPERATIVE LIVER BIOPSY FOR GALLBLADDER DISORDERS. (Ger.) Braune, R.; Ladewig, R. (Chirurgische Klinik, Ernst-Moritz-Arndt-Universitat, Fr.-Loeffler-Str. 23b, DDR-22 Greifswald, E. Germany). *Zentralbl. Chir.* 103(1):55-58; 1978.

Liver biopsy specimens were taken intraoperatively from a random series of 447 patients operated on for gallstones. The histological changes found in the liver biopsy specimens were banal or only slightly pathological in over 90% of all cases, and the hepatic changes failed to correlate with the histological changes of the gallbladder or with the duration of cholelithiasis. The findings indicate that routine liver biopsy during surgery for cholelithiasis is unnecessary and should be restricted to selected cases.

4954 LAPAROSCOPY IN CHOLESTASIS. (Ger.) Lindner, H. (Deutsches Rotes Kreuz Krankenhaus, Hamburg, W. Germany). *Therapiewoche* 26(41): 6396, 6398-6399; 1976.

Laparoscopy was performed in 382 patients with suspected cholestasis. Anicteric or subicteric cholestasis was diagnosed on the basis of the laparoscopic and complementary examinations in 57 cases, icteric cholestasis in 19, viral hepatitis with cholestasis in 30, cholecystitis in 66, gallbladder carcinoma in 21, liver metastases in 72, primary liver carcinoma in 20, pancreatic carcinoma in 24, drug-induced hepatopathy in 31, and primary biliary cirrhosis in 42. Green liver was not found in all cases of extrahepatic obstruction syndrome; it was not possible to distinguish between recent intrahepatic and extrahepatic cholestasis from the color of the liver. Green liver was also found in patients with acute viral hepatitis and alcoholic hepatitis with cholestasis. Pancreatic carcinoma was not detected in 85% of the 24 patients with carcinoma of the pancreas, but it was detected by laparoscopy in 22/24 cases. Injected vessels and adhesions of the gallbladder are indicative of cholecystitis, cholecytolithiasis, or choledocholithiasis. Laparoscopy is suitable for the exact staging of primary liver cirrhosis ranging from ductular lesions to nodular green cirrhosis. Laparoscopy should always precede laparotomy in the differential diagnosis of cholestases.

4955 NONVISUALIZATION OF THE GALLBLADDER BY ^{99m}Tc-HIDA CHOLESCINTIGRAPHY AS EVIDENCE OF CHOLECYSTITIS. (Eng.) Pare, P.; Shaffer, E. A.; Rosenthall, L. (Faculty Medicine, Univ. Calgary, Calgary, Alberta T2N 1N4, Canada). *Can. Med. Assoc. J.* 118(4):384-386; 1978.

The significance of nonvisualization of the gallbladder by cholescintigraphy with N-substituted iminodiacetic acid (HIDA) labeled with ^{99m}technetium in comparison with standard radiologic examinations was studied. In 43 healthy subjects, the gallgladder was visualized by the two methods. By contrast, all 27 patients in whom the gallbladder was not visualized by cholescintigraphy had cholecystitis. When visualization failed to occur, repeat cholescintigraphy after an injection of cholecystokinin (1 Crick-Harper Raper U/kg, i.v.) demonstrated the status of the cystic duct. Visualization excludes cystic duct obstruction and acute cholecystitis, whereas persistent nonvisualization indicates cystic duct obstruction.

4956 CONTEMPORARY METHODS IN THE DIAGNOSIS AND TREATMENT OF NONCALCULOUS CHOLECYSTITIS. (Rus.) Galkin, V. A. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Ter. Arkh.* 49(10): 110-115; 1977.

Various aspects of the diagnosis and treatment of noncalculous cholecystitis (NC) are reviewed. NC is frequently accompanied by dyskinesia of the gallbladder. The chief diagnostic technique is examination of the bile: increased bile content (compared to the normal values) in the gallbladder and slow excretion of bile are indicative of hypo- or atonic dyskinesia of the gallbladder. Treatment includes dieting, antibiotics (penicillin, 300,000 IU q.i.d. for 10 days, i.m. or 100,000-500,000 IU/day, intraduodenally; streptomycin, 0.5 g b.i.d.; erythromycin, 600,000-800,000 IU/day; and tetracycline, 500,000 IU/day for 3 weeks, p.o.), and choleretic drugs.

4957 DESTRUCTIVE CHOLECYSTITIS IN CHILDREN. (Rus.) Grigovich, I. N.; Mikhalkina, A. T. (Dept. Pediatric Surgery, State Univ., Petrozavodsk, USSR). *Khirurgiia* (1):89-92; 1978.

The case histories of 57 children (aged 2 months to 14 yr) with destructive cholecystitis are reviewed. Seventeen children had intercurrent diseases; 7 had diseases of the respiratory system, 7 had intestinal infections, 1 had scarlet fever, 1 had massive passage of worms, and 1 had abdominal trauma. The first clinical symptoms of destructive cholecystitis included abdominal pain (53), vomiting (40), fever (43), and suppression of the stool (23). Only three patients were correctly diagnosed, while in the rest the disease was initially misdiagnosed as acute appendicitis, intestinal obstruction, or acute cholecystitis. Surgery included cholecystectomy (51), cholecystostomy (3), cholecystostomy with removal of the ascarides (1), and formation of ileostoma without revision of abdominal organs (1). At surgery, 35 patients were found to have phlegmona of the gallbladder, 10 to have gangrene of the gallbladder, 5 to have necrosis due to the entropion, 6 to have perforation of the gallbladder wall, and 1 to have concrements. Of 57 patients, 52 were cured and 4 died (1 patient could not be followed up).

4958 NON-SURGICAL ENDOSCOPIC PAPILLOTOMY IN 10 PATIENTS WITH CHOLEDOCHOLITHIASIS. (Dut.) Tytgat, G. N.; Bartelsman, J.; Huibregtse, K.; Agenant, D. (Kliniek voor Inwendige Geneeskunde, Wilhelmina Gasthuis, Universiteit van Amsterdam, Amsterdam, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(39):1504-1508; 1977.

Ten patients with choledocholithiasis underwent nonsurgical endoscopic papillotomy. Surgical intervention was contraindicated in seven patients due to advanced age with and without concomitant diseases (cardiac decompensation, emphysema, or liver cirrhosis). Three patients also had jaundice. The endoscopic papillotomy was successful in all 10 cases. Only one patient developed a complication (relatively mild pancreatitis). The findings indicate that endoscopic papillotomy is a good alternative to surgery in the treatment of retained common bile duct stones, especially in high-risk patients.

4959 THE NON-SURGICAL TREATMENT OF GALLSTONES LEFT BEHIND IN THE COMMON BILE DUCT. (Dut.) Leguit, P. (Heelkundige Kliniek, Binnengasthuis, Amsterdam, Netherlands). *Ned. Tijdschr. Geneeskd.* 121(39):1500-1503; 1977.

Nonsurgical methods for the removal or dissolution of residual gallstones in the common bile duct are reviewed. Gallstones can be dissolved by irrigation through a T-tube with ether, ethanol-chloroform mixtures, physiological saline solution, heparin-salt solutions, or sodium cholate solution. It is also possible to use the T-tube canal to remove gallstones mechanically by means of instruments. Gallstones can also be removed through the papilla of Vater by endoscopic retrograde cannulization with or without electrosurgical papillotomy. Bile acids, such as chenodeoxycholic acid, and spasmolytics can be used as drugs to dissolve residual stones.

4960 TREATMENT OF CHOLELITHIASIS WITH CHENODEOXYCHOLIC ACID. EXPERIENCE FROM A 6-MONTH PERIOD. (Hun.) Magyar, I.; Papp, J.; Kisfaludy, S.; Feher, T.; Abonyi, M.; Hajos, E. (I. Belgyogyaszati Klinika, Semmelweis Orvostudomanyi Egyetem, Budapest, Hungary). *Orv. Hetil.* 117(50):3040-3047; 1976.

Ten patients with cholelithiasis were treated with chenodeoxycholic acid (3 x 250 mg/day, p.o.). The length of the treatment was at least 6 months in 9 cases. The bile stones failed to give a positive shadow before the treatment. Complete dissolution of the stones was seen within 3 months in three patients; the treatment had to be suspended in three other patients because of complications, while the other four patients are still under treatment but have shown no change after 6 months. The treatment caused no substantial changes in the serum bile pigment, cholesterol, triglyceride, or alkaline phosphatase levels, while the SGOT level showed a slight increase in some cases. The findings indicate that chenodeoxycholic acid treatment can be expected to be most efficient in patients with properly filling, normally functioning gallbladders, and with stones having negative shadow and low lithogenic index.

4961 DISSOLUTION OF HUMAN GALLSTONE WITH CLOFIBRATE. (Eng.) Garcia-Romero, E.; Lopez-Cantarero, M.; Arcelus, I. M. (Hospital Clinico San Cecilio, Univ. Granada, Granada, Spain). *J. Surg. Res.* 24(1):62-64; 1978.

The effect of different concentrations of clofibrate upon biliary cholesterol calculi was studied using 22 gallstones from one patient who had undergone cholecystectomy. All the calculi completely dissolved within the first 25 days after being placed in contact with the clofibrate solution. The rate of dissolution of the calculi was directly proportional to the concentration of clofibrate in the solution used (250, 500, 1,000, or 1,500 mg in 5 ml of ethyl alcohol). With the 1,500-mg clofibrate solution, the calculi were completely dissolved within 15 days. Clofibrate possesses a greater litholitic capacity than any of the other substances discovered so far, and it is known to have no undesirable side-effects.

4962 CHENOTHERAPY FOR GALLSTONE DISSOLUTION. I. EFFICACY AND SAFETY. (Eng.) Thistle, J. L.; Hofmann, A. F.; Ott, B. J.; Stephens, D. H. (Mayo Clinic and Mayo Foundation, Rochester, MN 55901). *JAMA* 239(11):1041-1046; 1978.

The results of chenodeoxycholic acid therapy for dissolving gallstones in 90 patients are reported, with particular attention to determinants of response. Of 12 patients receiving 15 mg/kg/day or more, 10 responded; only 15 of 40 patients receiving less than 15 mg/kg/day responded. Only 1 of 10 patients with large, solitary stones responded, while 14 of 30 patients with several stones responded. Of five patients in whom the gallbladder was repeatedly poorly visualized, none responded to therapy. Eighteen patients with radiopaque stones did not respond. Five of 10 patients with stones in the common bile duct responded. Small, dose-related elevations in SGOT were the only biochemical abnormality observed during treatment. Liver biopsy specimens showed no notable abnormality. Diarrhea was an infrequent problem. Stones recurred in 3 of 15 patients during 6 to 48 months of observation without treatment. Chenodeoxycholic acid, when given in adequate dosage, continues to appear promising as medical therapy for asymptomatic radiolucent gallstones in radiologically visualizing gallbladders.

4963 CHENOTHERAPY FOR GALLSTONE DISSOLUTION. II. INDUCED CHANGES IN BILE COMPOSITION AND GALLSTONE RESPONSE. (Eng.) Hofmann, A. F.; Thistle, J. L.; Klein, P. D.; Szczepanik, P. A.; Yu, P. Y. S. (Univ. Hosp., San Diego, CA 92103). *JAMA* 239(12):1138-1144; 1978.

Changes in bile saturation and biliary bile acid composition in patients with gallstones who received chenodeoxycholic (chenic) acid, cholic acid (both at 15 mg/kg/day for 1 yr), or placebo were determined using gas chromatography and mass spectrometry. Chenodeoxycholic acid induced bile desaturation; this effect was attributable solely to a decrease in the proportion of cholesterol. By gas chromatography, chenodeoxycholic acid increased substantially in the biliary bile acids of patients receiving it, and by mass spectrometry, no unusual bile acids were detected in appreciable amounts. Changes in bile saturation and biliary bile acid composition were then related to chenodeoxycholic acid dosage, and all of these variables were, in turn, related to gallstone response. In general, patients whose gallstones dissolved ingested a higher dose of chenodeoxycholic acid (or had bile that contained a higher proportion of this acid) and it was more unsaturated, but there were many exceptions, casting doubt on the value of a single analysis of fasting-state bile for predicting gallstone dissolutions. The major factor influencing response, provided dosage is adequate, appears to be gallstone type. Nonetheless, the proportion of chenodeoxycholic acid in biliary bile acids can probably be used to infer patient compliance.

4964 TREATMENT OF RESIDUAL COMMON DUCT STONES BY INTRACHOLEDOCHAL HEPARINIZED SALINE. (Ger.) Dromer, H. (Chirurgische Abteilung, Einheit Kreiskrankenhaus-Kreispoliklinik, Kothener Str. 13, DDR-33 Schonebeck Elbe, E. Germany). *Zentralbl. Chir.* 102(24):1501-1505; 1977.

Three patients cholecystectomized for cholelithiasis were treated with heparin (3 x 25,000 U/day in 20 ml isotonic saline solution) through a T-drain to dissolve residual stones in the common bile duct. The treatment was begun 6-7 days after surgery. Complete dissolution of the stones was observed cholangiographically. The patients are in good condition, without recurrence.

4965 CANCER RISK IN DIFFERENT TYPES OF GALLSTONES. (Ger.) Grosse, H. (Bezirkskrankenhaus-Prosektur, Billrothstr. 22, DDR-23, Stralsund, E. Germany). *Arch. Geschwulstforsch.* 47(8):710-718; 1977.

The cancer risk related to different types of gallstones was studied in a series of 22,868 adults autopsied in the Stralsund area during the 1945-1967 period. Cholelithiasis was found in 6,973 cases and evidence of cholecystectomy in 438. Malignant tumors were found in 1,256/4,680 women with gallstones; 241 of the tumors were gallbladder carcinomas. Malignant tumors were found in 611/2,293 men with gallstones; the tumors included only 37 gallbladder carcinomas. Regardless of the type of gallstone, carcinomas of the lungs, stomach, intestines, and prostate were more frequent than gallbladder carcinomas among the men with gallstones. Among women with pigment stones or primary cholesterol stones, cancers of organs other than the gallbladder were also more frequent than those of the gallbladder; but gallbladder carcinoma was the most frequent tumor in women with secondary gallstones (especially in those with secondary facetted gallstones), while gallbladder carcinoma was rare among women with cholesterol, pigment, or mulberry gallstones. In women, the incidence of gallbladder carcinoma increased with the increase in the partial volume of the gallstone and the incidence of cholecystitis.

4966 CHOLESTASIS: PUMP FAILURE, MICROVILLI DEFECT, OR BOTH? (Eng.) Erlinger, S. (Hopital Beaujon, 92118 Clichy Cedex, France). *Lancet* 1(8063):533-534; 1978.

A new hypothesis to explain cholestasis is offered as a result of a review of several experimental models (estrogen-, cytochalasin B-, and phalloidin-induced) of cholestasis. Bile formation involves active pumping of one or several solutes into the lumen of a channel. Cholestasis may be the consequence of either an alteration of the pumps (the systems responsible for solute transport: either the bile salt pump or the Na^+- and K^+-ATPase sodium transport system) or an alteration of the channels (as in the alteration of the canalicular microvilli resulting from microfilament dysfunction). Evidence that both mechanisms operate is presented.

4967 JAUNDICE AND PERINATAL INFECTION. (Hun.) Fekete, M.; Vinceller, M.; Horvath, M. (Gyermekklinika, Pecsi Orvostudomanyi Egyetem, Pecs, Hungary). *Orv. Hetil.* 118(46):2751-2754; 1977.

The changes of the serum bilirubin level were studied in 174 full-term babies and 160 premature babies who suffered from perinatal infectious hepatitis or idiopathic hyperbilirubinemia during the first 3 weeks of postnatal life. Idiopathic hyperbilirubinemia was diagnosed in 110 premature and 92 full-term babies and perinatal infectious hepatitis in 50 premature and 82 full-term babies. The serum bilirubin level of the premature babies with infectious hepatitis was significantly higher ($p<0.01$) than that of the premature babies with hyperbilirubinemia during the first week of life, after which there was no significant difference. In full-term babies, perinatal infection was not accompanied by elevated serum bilirubin level. The findings suggest that the hyperbilirubinemia seen in perinatal infectious hepatitis and idiopathic hyperbilirubinemia is due to unknown, possibly identical, mechanisms in the two entities that are independent of the biochemical and functional maturity of the newborn babies.

4968 "PSEUDOSTONE" OF THE GALLBLADDER: ULTRASOUND FINDINGS AND CASE REPORT. (Eng.) McCune, B. R.; Weeks, L. E.; O'Brien, T. F., Jr.; Martin, J. F. (Bowman Gray Sch. Medicine, Winston-Salem, NC 27103). *Gastroenterology* 73(5):1149-1151; 1977.

A case report is presented to illustrate an artifact referred to as "pseudostone," in which all the diagnostic criteria for gallstones were fulfilled but in which gallstones did not exist. The ultrasonic criteria for the diagnosis of gallbladder calculi are (a) echo-dense structures that disturb the smooth contour of the posterior border of the gallbladder, (b) sonic shadowing, and (c) echoes from within the gallbladder. Diagnostic confidence increases greatly in cases in which internal echoes, contour irregularities, and sonic shadows have occurred simultaneously. Although all three criteria were met in the patient, the pseudostone phenomenon was confirmed by varying the patient's respiration and showing that the "pseudostone" represented echoes from a loop of bowel that produced a significant impression on the posterior wall of the gallbladder during deep inspiration. The absence of cholelithiasis was confirmed by oral cholecystography. The confirmation of ultrasound diagnosis by direct multiple visualizations of a defect combined with the demonstration of the persistence of the defect with different phases of respiration is essential in differentiating true gallstones from pseudostones.

4969 PLASTIC SURGERY IN STRICTURES OF THE COMMON BILE AND HEPATIC DUCTS. (Rus.) Gal'perin, E. I.; Kuzovlev, N. F. (Dept. Clinical and Experimental Liver Surgery, Inst. Transplantation of Organs and Tissues, Moscow, USSR). *Khirurgiia* (1):63-72; 1978.

The results of the surgical treatment of 85 patients with recurrent cicatrical strictures of the common bile and hepatic ducts are presented. The majority of the patients had a history of three to four unsuccessful plastic operations on the bile ducts. Fifty-seven patients had prolonged jaundice, 24 had cholangitis, and 17 had complete external biliary fistula. Stricture of the common biliary duct was recorded in 32 patients and high cicatrical stricture was detected in 53 patients. Surgery included dissection of the strictures with formation of the bilio-biliary anastomosis (10 patients, 4 developed recurrences), bougienage of the low stricture (3 patients, 1 died, and 1 developed recurrence), bougienage of the high stricture (4 patients, 2 developed recurrence), formation of various bilio-digestive anastomoses (44 patients who underwent hepaticojejunostomy of whom 6 developed recurrence; 3 patients who underwent hepaticoduodenostomy of whom all developed recurrence), and thorough transhepatic drainage (35 patients).

4970 ORAL CHOLECYSTOGRAPHY. INDICATIONS, COUNTERINDICATIONS AND ABSENCE OF OPACIFICATION. (Fre.) Nahum, H.; Girault, M. J. (Hopital Beaujon, 100, boulevard du General Leclerc, 92110 Clichy, France). *Rev. Prat.* 27(22):1403-1404; 1977.

4971 INDICATIONS AND RELEVANCE OF PERORAL AND INTRAVENOUS CHOLEGRAPHY. (Ger.) Freitag, J.; Mokros, W.; Freitag, G.; Bartels, F.; Schenk, E. (Radiologischen Klinik der Medizinischen Akademie Magdeburg, Leipziger Str. 44, DDR-301 Magdeburg, E. Germany). *Dtsch. Gesundheitsw.* 32(15):694-699; 1977.

4972 DIAGNOSTIC SIGNIFICANCE OF IDENTIFICATION OF ALKALINE PHOSPHATASE, HISTIDASE AND UROKANINASE IN THE BILE IN DISEASES OF THE HEPATOBILIARY SYSTEM IN CHILDREN. (Rus.) Zernov, N. G.; Epikhin, N. V. (Dept. Pediatrics, Moscow Medical Inst. Stomatology, Moscow, USSR). *Pediatriia* (3):56-59; 1977.

4973 OPERATIVE DIAGNOSIS OF DISEASES INVOLVING BILE PASSAGES BY MEANS OF ROENTGEN-TV CHOLANGIOGRAPHY. (Rus.) Pantsyrev, Yu. M.; Ryabov, V. I.; Savrasov, V. M. (Clinic Hosp. Surgery and Anesthesiology, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (3):85-90; 1977.

4974 ULTRASONIC METHODS IN THE DIFFERENTIAL DIAGNOSIS OF POSTCHOLECYSTECTOMY SYNDROME.

(Ger.) Braun, B.; Schwerk, W. (Med. Poliklinik der Universitat, Robert-Koch-Strasse 7a, D-3550 Marburg/Lahn, W. Germany). *Munch. Med. Wochenschr.* 119(29/30):975-978; 1977.

4975 USE OF CHOLECYSTOKININ-PANCREOZYMIN FOR THE TREATMENT OF SOME DISEASES OF THE PANCREATIC-BILIARY SYSTEM. (Rus.) Darmostuk, V. Yu. (Clinic Hepatic and Pancreatic Diseases, Dnepropetrovsk Scientific Res. Inst. Gastroenterology, Dnepropetrovsk, USSR). *Vrach. Delo* (5): 28-32; 1977.

4976 EXPERIENCE WITH THE PANCHELIDON TREATMENT OF BILIARY TRACT DISEASES. (Ger.) Neumann-Mangoldt, P. (Maximilianstrasse 6, 8130 Starnberg, W. Germany). *Med. Welt* 28(4):181-185; 1977.

4977 COMPLICATIONS OF CHOLECYSTECTOMY IN THE ELDERLY. (Rus.) Antonenkov, G. M.; Kochiashvili, V. I.; Beliaev, M. P. (Dept. Surgery and Topographic Anatomy, Moscow N. A. Semashko Inst. Stomatology, Moscow, USSR). *Khirurgiia (Mosk.)* (3):111-113; 1977.

4978 LONG-TERM RESULTS OF SURGERY INVOLVING CHOLEDOCHODUODENOSTOMY. (Rus.) Filimonov, M. I. (S. I. Spasokukotskii Dept. Surgery, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Sov. Med.* (2):119-123; 1977.

4979 CONGENITAL DILATATION OF THE CHOLEDOCHUS OR COMPLICATION OF RESECTION OF THE SPHINCTER OF ODDI. (Fre.) Vignal, J.; Lamerant, P. (Hopital Edouard-Herriot, 69374 Lyon Cedex 2, France). *Lyon Chir.* 73(4):302-304; 1977.

4980 INTERNAL DRAINAGE IN BILE DUCT SURGERY. (Rus.) Toskin, K. D.; Belomar, I. D.; Khaikin, Ya. B.; Zhebrosky, V. V.; Starosek, V. N. (Surgical Clinic, Crimean Medical Inst., Crimea, USSR). *Khirurgiia (Mosk.)* (3):22-26; 1977.

4981 ACCIDENTAL INJURY OF THE HEPATIC ARTERY, PORTAL VEIN, AND HEPATIC BILE DUCTS DURING SURGERY. (Rus.) Tabakov, A. I. (First Dept. Surgery, M. Gor'kii Zaporozh'e Inst. Advanced Medical Studies, Zaporozh'e, USSR). *Vestn. Khir.* 118 (5):123-127; 1977.

4982 ROLE OF THE DUODENUM IN BILIOPANCREATIC LESIONS. (Ita.) Berti Riboli, E.; Reboa, G.; Mortola, G. P. (Istituto Clinica Chirurgica Generale e Terapia Chirurgica, Univ. Genova, Genova, Italy). *Minerva Gastroenterol.* 23(1):35-36; 1977.

4983 PARIETAL DIGESTION IN CHRONIC DISEASES OF THE BILIARY TRACT AND THE LIVER. (Rus.) Danovsky, L. V. (Second Dept. Pediatrics, V. I. Lenin Kazan Inst. Advanced Medical Studies, Kazan, USSR). *Ter. Arkh.* 49(2):55-60; 1977.

4984 HUMORAL CHANGES IN BILIARY TRACT DISEASES ASSOCIATED WITH GASTRITIS. (Rus.) Kiriliuk, N. A.; Loboda, N. I.; Lukianchuk, D. G. (Propedeutic Dept. Internal Medicine, Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* (3):27-30; 1977.

4985 BOUVERET'S SYNDROME (PYLORODUODENAL OBSTRUCTION DUE TO BILIARY CALCULUS): REPORT OF A NEW CASE. (Fre.) Meyer, C.; Keller, D.; Hollender, L. F. (Centre Hospitalier Universitaire, 67005 Strasbourg Cedex, France). *Lyon Chir.* 73(4): 299-301; 1977.

4986 CLINICAL AND THERAPEUTIC CONSIDERATIONS ON PRIMARY MALIGNANT TUMORS OF THE TERMINAL BILE DUCT. (Ita.) Rocco, B. (Istituto di Patologia Chirurgica e Propedeutica Clinica, Universita di Siena, Siena, Italy). *Arch. Ital. Chir.* 100(2):211-215; 1977.

4987 ASSOCIATION OF PORCELAIN GALLBLADDER WITH DIGESTIVE TRACT CANCER [Letter to Editor]. (Fre.) Germain, M.; Martin, E.; Gremillet, C. (Hopital Antoine Beclere, 157, rue de la Porte de Trivaux, F 92140 Clamart, France). *Nouv. Presse Med.* 6(16):1393; 1977.

4988 BENIGN GALLBLADDER TUMORS. (Ita.) Nicoletta, G.; Muliere, P. (Ospedale Provinciale "San Carlo," Divisione Chirurgica, Potenza, Italy). *Minerva Med.* 68(3):191-196; 1977.

4989 POTENTIALS OF THE ROENTGENOLOGICAL METHOD IN THE DIAGNOSIS OF AN "EXCLUDED" BLADDER. (Rus.) Markvarde, M. M.; Sergeeva, I. I.; Rozhkovskaya, V. V.; Zhevnova, T. I. (Dept. Roentgenology, Minsk Medical Inst., Minsk, USSR). *Khirurgiia (Mosk.)* (3):31-34; 1977.

4990 THE IMPORTANCE OF SOME BIOCHEMICAL BILE CHARACTERISTICS IN DIAGNOSING CHRONIC CHOLECYSTITIS. (Rus.) Masevich, Ts. G.; Tsykin, D. B.; Ignatova, N. Z. (Propedeutic Dept. Internal Medicine, Leningrad Inst. Medicine and Hygiene, Leningrad, USSR). *Sov. Med.* (2):60-63; 1977.

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(Rus.) Yukhtin, V. I.; Lyubsky, A. S.; Chadaev, A. P.; Sacka, A. A. (Dept. General Surgery, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Khirurgiia (Mosk.)* (3):10-14; 1977.

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4996 TREATMENT EFFICIENCY OF PATIENTS WITH CHRONIC CHOLECYSTITIS AT THE "SHAYAN" HEALTH RESORT. (Rus.) Marksiti, L. T.; Torokhtin, M. D.; Kozachenko, R. Ya.; Bygova, L. M.; Lendiel, M. F.; Siksai, P. S. (Uzhgorod Branch, Odessa Scientific Res. Inst. Balneology, "Shaian" Sanitorium, Uzhgorod, USSR). *Vrach. Delo* (3):43-45; 1977.

See also, 4423, 4441, 4485, 4556, 4558, 4561, 4562, 4563, 4564, 4565, 4566, 4568, 4569, 4579, 4588, 4592, 4595, 4600, 4602, 4677, 4704, 4719, 4782, 4800, 4806, 4808, 4810, 4839, 4853, 4854, 4922, 5023, 5028, 5038, 5043, 5052.

GENERAL

4997 CHANGES IN THE EXOCRINE FUNCTION OF THE PANCREAS IN RELATION TO ANESTHESIA AND SURGERY. (Rus.) Rusakov, V. I.; Parsieva, A. I. (Dept. Surgery, Rostov Medical Inst., Rostov, USSR). *Anesteziol. Reanimatol.* (2):70-73; 1977.

The effect of anesthesia on the exocrine function of the pancreas was studied in 41 patients who underwent surgery for urethral stricture. Group 1 (10 patients) received endotracheal fluothane anesthesia, group 2 (13 patients) neuroleptanalgesia with fentanyl, and group 3 (18 patients) received ether anesthesia. The serum amylase, lipase, trypsin, and trypsin inhibitor levels were determined before, immediately after, and 1-7 days after anesthesia. Fluothane anesthesia caused a marked increase in the serum amylase (17.7% versus 14.9%), lipase (51 mU versus 18.6 mU), and trypsin (4.1 mU versus 2.9 mU) levels and a marked reduction of the trypsin inhibitor level (252.9 mU versus 357.3 mU) immediately after the anesthesia. The enzyme levels did not normalize completely in 7 days. Neuroleptanalgesia did not cause significant changes in the enzyme levels. Ether anesthesia strongly inhibited all enzymes, especially lipase (its level dropped to 0), and decreased the trypsin inhibitor level. The response of the pancreas to anesthesia is dependent on the type of anesthesia administered.

4998 ENTEROTOXIN ANTIBODIES IN RELATION TO DIARRHOEA IN SWEDISH SOLDIERS IN CYPRUS. (Eng.) Svennerholm, A. M.; Back, E.; Holmgren, J. (Univ. Gothenburg, Gothenburg, Sweden). *Bull. W.H.O.* 55(6):663-668; 1977.

The development of antibodies to *Escherichia coli* heat-labile enterotoxin (LT) and its relation to diarrhea was studied in two Swedish battalions, one in the winter (WB, 560 men) and one in the summer (SB, 450 men), in Cyprus. Whereas only 6-15% of the soldiers had detectable levels of anti-LT antibodies in their sera before leaving Sweden, as many as 69% of the SB and 43% of the WB soldiers who developed diarrhea in Cyprus acquired significant titers of enterotoxin antibodies in their sera (acute phase serum). During the summer, many soldiers without diarrhea also obtained anti-LT antibodies, whereas no such response was observed in healthy soldiers during the winter. Civilian Turkish Cypriots had positive sera in high frequency (60-66%) during both study periods. Parallel titration of positive sera against *E. coli* LT and cholera toxin indicated that the enterotoxin-neutralizing antibodies registered were induced by bacteria producing enterotoxin identical or closely related to LT.

4999 COLONIC STENOSIS AND ATRESIA FOLLOWING NEONATAL NECROTISING ENTEROCOLITIS. (Eng.) Schafer, J.; Young, D. G. (Royal Hosp. Sick Children, Yorkhill, Glasgow G3 8SJ, Scotland). *Z. Kinderchir.* 22(2):145-152; 1977.

5000 MASSIVE UPPER GASTROINTESTINAL HEMORRHAGE IN THE ELDERLY. (Eng.) Chang, F. C.; Drake, J. E.; Farha, G. J. (Univ. Kansas Sch. Medicine--Wichita, Wichita, KS 67214). *Am. J. Surg.* 134(12):721-723; 1977.

GENERAL

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5004 THE ROLE OF THE LIVER IN THE CHANGES OF ACID-BASE BALANCE AND PLASMA LIPIDS DURING SURFACE-INDUCED DEEP HYPOTHERMIA. (Eng.) Shida, H.; Morimoto, M.; Inokawa, K.; Tsugane, J. (Faculty Medicine, Shinshu Univ., Matsumoto, Japan). *Jpn. J. Surg.* 7(3):139-146; 1977.

5005 MANAGEMENT OF GASTROENTERITIS IN EARLY CHILDHOOD. (Eng.) Holdaway, M. D. (Univ. Otago Medical Sch., P.O. Box 913, Dunedin, New Zealand). *Drugs* 14(5):383-389; 1977.

5006 THERAPEUTIC EMBOLIZATION WITH LONG-TERM OCCLUDING AGENTS AND THEIR EFFECTS ON EMBOLIZED TISSUES. (Eng.) White, R. I., Jr.; Strandberg, J. V.; Gross, G. S.; Barth, K. H. (Johns Hopkins Medical Inst., Baltimore, MD 21205). *Radiology* 125(3):677-687; 1977.

5007 SUBMANDIBULAR AND MINOR SALIVARY GLAND CARCINOMA: A 15-YEAR REVIEW. (Eng.) McGregor, G. I.; Robins, R. E. (750 W. Broadway, Vancouver, British Columbia, Canada). *Am. Surg.* 43(11):737-742; 1977.

5008 HEMAGGLUTINATION OF HUMAN GROUP A ERYTHROCYTES BY ENTEROTOXIGENIC Escherichia coli ISOLATED FROM ADULTS WITH DIARRHEA: CORRELATION WITH COLONIZATION FACTOR. (Eng.) Evans, D. G.; Evans, D. J., Jr.; Tjoa, W. (Univ. Texas Medical Sch. at Houston, Houston, TX 77030). *Infect. Immun.* 18(2):330-337; 1977.

5009 THE ENTERIC FLORA IN CHILDHOOD DISEASE--DIARRHEA. (Eng.) Lifshitz, F. (North Shore Univ. Hosp., Manhasset, NY 11030). *Am. J. Clin. Nutr.* 30(11):1811-1818; 1977.

5010 NEW STRATEGIES FOR TREATING WATERY DIARRHEA. (Eng.) Field, M. (Univ. Chicago, Pritzker Sch. Medicine, Chicago, IL 60637). *N. Engl. J. Med.* 297(20):1121-1122; 1977.

5011 PATTERN ANALYSIS OF EPIDEMIOLOGICAL VARIABLES APPLIED IN THE STUDY OF WEANLING DIARRHOEAL DISEASE. (Eng.) Sayers, B. McA.; Mansourian, P. G. (Engineering in Medicine Lab., Imperial Coll., London SW7, England). *Med. Informatics* 2(2):69-89; 1977.

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5016 CHRONIC CONSTIPATION IN CHILDHOOD. (Eng.) Anonymous. (No affiliation given). *Lancet* 2(8047):1064-1066; 1977.

5017 ROTAVIRUS AND WINTER GASTRO-ENTERITIS IN WHITE SOUTH AFRICAN INFANTS. (Eng.) Schoub, B. D.; Robins-Browne, R. M.; Lecatsas, G.; Still, C. S.; Miliotis, M.; Koornhof, H. J.; Prozesky, O. W. (Natl. Inst. Virology, Dept. Health, Johannesburg, South Africa). *S. Afr. Med. J.* 52(25):998-999; 1977.

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5019 METABOLISM OF HISTAMINE IN MYOTONIC DYSTROPHY: A DUAL PATTERN OF INACTIVATION OF INTESTINAL HISTAMINE. (Eng.) Sjaastad, O.; Sjaastad, O. V. (Rikshospitalet, Oslo, Norway). *Acta Neurol. Scand.* 56(5):413-429; 1977.

5020 THE FIRM SALIVARY MASS IN CHILDREN. (Eng.) Schuller, D. E.; McCabe, B. F. (456 Clinic Drive, Room 4138, Columbus, OH 43210). *Laryngoscope* 87(11):1891-1898; 1977.

5021 A LARGE OUTBREAK OF FOODBORNE SALMONELLOSIS ON THE NAVAJO NATION INDIAN RESERVATION, EPIDEMIOLOGY AND SECONDARY TRANSMISSION. (Eng.) Horwitz, M. A.; Pollard, R. A.; Merson, M. H.; Martin, S. M. (Center Disease Control, Atlanta, GA 30333). *Am. J. Public Health* 67(11):1071-1076; 1977.

5022 STUDIES ON ISOAMYLASES OF SALIVA AND URINE IN NORMAL SUBJECTS AND IN PATIENTS WITH DISEASES OF THE SALIVARY GLAND. (Eng.) Sirsat, A. V.; Talavdekar, R. V.; Rajpal, R. M. (Tata Memorial Hosp., Parel, Bombay-400 012, India). *Indian J. Cancer* 14(1):58-63; 1977.

5023 DISORDERS OF GALACTOSE METABOLISM. (Eng.) Rennert, O. M. (Univ. Oklahoma, Coll. Medicine, Oklahoma City, OK 73190). *Ann. Clin. Lab. Sci.* 7(6):443-448; 1977.

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5025 CLOSTRIDIA AS INTESTINAL PATHOGENS. (Eng.) Anonymous. (No affiliation given). *Lancet* 2(8048):1113-1114; 1977.

5026 VIRAL AND BACTERIAL GASTROENTERITIS. (Eng.) Forgacs, P. (Lahey Clinic Foundation, Boston, MA). *Lahey Clin. Found. Bull.* 26(4):167-171; 1977.

5027 INCIDENCE OF SOME SURGICALLY CORRECTABLE CONGENITAL ABNORMALITIES IN SOUTH AUSTRALIA. (Eng.) Thomas, M. P. (Adelaide Children's Hosp., 72 King William Rd., North Adelaide, South Australia 5006, Australia). *J. Pediatr. Surg.* 12(5):693-701; 1977.

5028 INFECTIOUS DISEASES OF GASTROINTESTINAL ORIGIN IN THE RICHMOND, VIRGINIA, AREA. (Eng.) Allison, M. J.; Dalton, H. P.; Escobar, M. R. (Medical Coll. Virginia, MCV Station, Richmond, VA 23298). *Va. Med.* 104(10):693-695; 1977.

5029 UNSUSPECTED HYPEROSMOLALITY OF ORAL SOLUTIONS CONTRIBUTING TO NECROTIZING ENTEROCOLITIS IN VERY-LOW-BIRTH-WEIGHT INFANTS. (Eng.) Willis, D. M.; Chabot, J.; Radde, I. C.; Chance, G. W. (Hosp. Sick Children, Toronto, Ontario, Canada). *Pediatrics* 60(4):535-538; 1977.

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5031 THE RADIOLOGIC DIAGNOSIS OF MALIGNANT TUMORS OF THE SALIVARY GLANDS. (Eng.) Noyek, A. M.; Zizmor, J.; Musumeci, R.; Sanders, D. E.; Renouf, J. H. P. (Ste. 207, 99 Avenue Rd., Toronto, Ontario, Canada M5R 2G5). *J. Otolaryngol.* 6(5):381-385; 1977.

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5033 THE RENAL LESION IN CONGENITAL CHLORIDE DIARRHEA. (Eng.) Holmberg, C.; Perheentupa, J.; Pasternack, A. (Children's Hosp., Univ. Helsinki, SF-00290 Helsinki 29, Finland). *J. Pediatr.* 91(5):738-743; 1977.

5034 CLUSTERING OF NECROTIZING ENTERCOLITIS: INTERRUPTION BY INFECTION-CONTROL MEASURES. (Eng.) Book, L. S.; Overall, J. C., Jr.; Herbst, J. J.; Britt, M. R.; Epstein, B.; Jung, A. L. (Univ. Utah Coll. Medicine, 50 N. Medical Drive, Salt Lake City, UT 84132). *N. Engl. J. Med.* 297(18):984-986; 1977.

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5036 SPECIES OF GASTRIN IN PERNICIOUS ANEMIA. (Eng.) Fabri, P. J.; Johnson, J. A.; Turnipseed, W. D.; Keith, L. M., Jr.; McGuigan, J. E. (Coll. Medicine, Ohio State Univ., Columbus, OH). *Surg. Forum* 28:368-370; 1977.

5037 HYPERALIMENTATION. (Eng.) Fischer, J. E. (Massachusetts General Hosp., Boston, MA). *Adv. Surg.* 11:1-69; 1977.

5038 ANTIBACTERIAL ACTIVITY DETECTED IN DUODENAL JUICE. (Eng.) Umenai, T.; Sasaki, T.; Konno, T. (Tohoku Univ. Sch. Medicine, Sendai 980, Japan). *Tohoku J. Exp. Med.* 122(3):299-300; 1977.

5039 LIMITATIONS OF PATHOLOGIC DIAGNOSIS IN SALIVARY GLAND TUMORS. (Eng.) Harker, L. A. (Dept. Otolaryngology and Maxillofacial Surgery, Univ. Iowa, Iowa City, IA 52242). *Laryngoscope* 87(11):1899-1903; 1977.

5040 TOTAL PARENTERAL NUTRITION: A SAFE PROCEDURE IN THE SMALL COMMUNITY HOSPITAL? (Eng.) Brown, R. S.; Grenkoski, J. (Midland Hosp. Center, Midland, MI). *Crit. Care Med.* 5(5):241-244; 1977.

5041 NECROTIZING ENTEROCOLITIS IN THE NEONATE. (Eng.) Stevenson, J. K.; Stevenson, D. K. (Univ. Washington Sch. Medicine, Seattle, WA). *Surg. Annu.* 9:147-169; 1977.

5042 ZOLLINGER-ELLISON SYNDROME: SPECIAL CONSIDERATIONS. (Eng.) Hardy, J. D.; Doolittle, P. D. *In: Transactions of the Southern Association Eighty-Eighth Annual Meeting held at The Breakers, Palm Beach, Florida, December 6, 7, 8, 1976.* (Philadelphia: J. B. Lippincott): 88: 169-179; 1977.

5043 DISEASES OF THE LIVER AND ALIMENTARY TRACT. (Eng.) Miller, J. P. (Dept. Medicine, Univ. Manchester, Manchester, England). *Clin. Obstet. Gynaecol.* 4(2):297-317; 1977.

5044 GASTROINTESTINAL COMPLICATIONS OF TOLAZOLINE THERAPY [Letter to Editor]. (Eng.) Pearl, W. (William Beaumont Army Medical Center, El Paso, TX 79920). *J. Pediatr.* 91(6):1025-1026; 1977.

5045 A CONTROLLED STUDY OF 5-FLUOROURACIL VERSUS 5-FLUOROURACIL AND METHYL-CCNU IN ADVANCED GASTROINTESTINAL ADENOCARCINOMA. (Eng.) Abdallah, A. M.; Soukop, M.; Bell, G.; Calman, K. C. (Greenock Royal Infirmary, Univ. Glasgow, Glasgow, Scotland). *Clin. Oncol.* 3(3): 247-257; 1977.

5046 NUTRITIONAL ASSESSMENT AND THERAPY OF PROTEIN-CALORIE MALNUTRITION IN THE HOSPITAL. (Eng.) Bistrian, B. R. (New England Deaconess Hosp., Boston, MA). *J. Am. Diet. Assoc.* 71(4):393-397; 1977.

5047 STUDIES ON FOLIC ACID IN NIGERIAN INFANTS AND PRE-SCHOOL CHILDREN. (Eng.) Akinsete, F. I.; Boyo, A. E. (Coll. Medicine. Univ. Lagos, Private Mail Bag 12003, Lagos, Nigeria). *J. Trop. Pediatr. Environ. Child Health* 23(4):202-205; 1977.

5048 GASTROINTESTINAL HEMORRHAGE IN PATIENTS IN A RESPIRATORY INTENSIVE CARE UNIT. (Eng.) Harris, S. K.; Bone, R. C.; Ruth, W. E. (Univ. Kansas Medical Center, Kansas City, KS). *Chest* 72(3):301-304; 1977.

See also, 4527, 4528, 4534, 4535, 4545, 4549, 4576, 4577, 4581, 4582, 4583, 4584, 4639, 4640, 4657, 4667, 4691, 4701, 4712, 4713, 4715, 4717, 4743, 4766, 4775, 4987, 5053.

GENERAL

Parasitology

5049 AMEBIC LIVER ABSCESS: 1966-1976. (Eng.) Shabot, J. M.; Patterson, M. (Univ. Texas Medical Branch, Galveston, TX 77550). *Am. J. Dig. Dis.* 23(2):110-118; 1978.

A 10-yr retrospective analysis of 15 patients with amebic liver abscess is reviewed and represents a continuation of the previous 2-decade experience at one institution (37 patients). Records were studied to determine the population affected, presenting symptoms, physical and laboratory findings, and type of and response to therapy. Most patients were rural men of lower socioeconomic status in the third to fifth decade of life. They presented with a febrile illness with abdominal pain for an average of 2.5-months duration. The chief physical abnormalities were tender hepatomegaly (93%), right-sided pulmonary changes (40%), anorexia (80%), weight loss (mean, 24 pounds; 66%), and fever (66%). All patients had abnormal liver scan, positive amebic serology, and hypoalbuminemia (1.7-2.9 g/100 ml). All patients promptly responded to amebicidal therapy except one whose therapy was delayed. Clinical suspicion, liver scanning, serologic testing, and response to therapy are the keys to diagnosis.

5050 BACTERIAL COLONIZATION OF JEJUNAL MUCOSA IN GIARDIASIS. (Eng.) Tomkins, A. M.; Wright, S. G.; Drasar, B. S.; James, W. P. T. (Hosp. for Tropical Diseases, London, WC1, England). *Trans. R. Soc. Trop. Med. Hyg.* 72(1):33-36; 1978.

The jejunal flora of 14 patients with giardiasis and severe malabsorption were investigated to determine whether the latter represented an extreme form of giardiasis alone or resulted from additional contamination by enterobacteria. Nine of the 14 cases were found to have numerous bacteria adjacent to the mucosa and within luminal fluid samples from the upper jejunum. Three species of enterobacteria (*Klebsiella pneumoniae*, *Enterobacter cloacae*, and *E. Hafniae*) were cultured from eight patients. *Bacteroides* were isolated from only one patient. Enterobacteria were not cultured from seven of eight patients who had giardiasis but only mild malabsorption (of xylose only) or from seven patients with giardiasis without malabsorption. Intestinal colonization by enterobacteria may make an important contribution to the development of malabsorption in patients with giardiasis.

5051 INTESTINAL NEMATODES IN THE UNITED STATES. (Eng.) Blumenthal, D. S. (Emory Univ. Sch. Medicine, 69 Butler St., SE, Atlanta, GA 30303). *N. Engl. J. Med.* 297(26):1437-1439; 1977.

5052 ENDOSCOPIC CHOLANGIOGRAPHIC DIAGNOSIS OF ASCARIS IN THE COMMON BILE DUCT. (Eng.) Ramirez-Degollado, J.; Peniche-Bojorquez, J.; Olvera-Perez, O. (General Hosp., Av. Cuauhtemoc 330, Mexico 7, D.F., Mexico). *Gastrointest. Endosc.* 24(2):86-87; 1977.

5053 PAROTID ENLARGEMENT, FOREHEAD EDEMA, AND SUPPRESSION OF MALARIA AS NUTRITIONAL CONSEQUENCES OF ASCARIASIS. (Eng.) Murray, M. J.; Murray, A. B.; Murray, M. B.; Murray, C. J. (Dept. Medicine, Univ. Minnesota, Minneapolis, MN 55455). *Am. J. Clin. Nutr.* 30(2):2117-2121; 1977.

5054 AN UNUSUAL OUTBREAK OF HOOKWORM DISEASE IN NORTH INDIA. (Eng.) Koshy, A.; Raina, V.; Sharma, M. P.; Mithal, S.; Tandon, B. N. (All-India Inst. Medical Sciences, Ansari Nagar, New Delhi-110016, India). *Am. J. Trop. Med. Hyg.* 27(1): 42-45; 1978.

5055 *Schistosoma mansoni* AND *S. haematobium* INFECTIONS IN EGYPT. III. EXTRAHEPATIC PATHOLOGY. (Eng.) Cheever, A. W.; Kamel, I. A.; Elwi, A. M.; Mosimann, J. E.; Danner, R.; Sippel, J. E. (Natl. Inst. Health, Building 5, Room 114, Bethesda, MD 20014). *Am. J. Trop. Med. Hyg.* 27(1): 55-75; 1978.

5056 ANIMAL MODEL OF HUMAN DISEASE: GIARDIASIS. (Eng.) Stevens, D. P.; Roberts-Thomson, I. C. (Case Western Reserve Univ. Sch. Medicine, Cleveland, OH 44106). *Am. J. Pathol.* 90(2):529-532; 1978.

5057 TREATMENT OF GIARDIASIS WITH TINIDAZOLE. (Eng.) El Masry, N. A.; Farid, Z.; Miner, W. F. (U.S. Naval Medical Res. Unit No. 3, FPO, NY 09527). *Am. J. Trop. Med. Hyg.* 27(1):201-202; 1978.

See also, 4532, 4533, 4547, 4799, 4834, 5009, 5026.

GENERAL

Regional Enteritis

5058 EARLY LESIONS OF CROHN'S DISEASE. (Eng.) Laufer, L.; Costopoulos, L. (Univ. Pennsylvania Hosp., 3400 Spruce St., Philadelphia, PA 19104). *Am. J. Roentgenol.* 130(2):307-311; 1978.

Early lesions of Crohn's disease, visualized by double contrast techniques in the colon, small bowel, and stomach, are described. The aphthoid ulcers produce a "bull's-eye" or "target" lesion consisting of a small central collection of barium surrounded by a radiolucent halo due to the granulomatous inflammation. The appearance is identical in the colon, small bowel, and stomach. The early lesions may be seen adjacent to or at a distance from a segment of more severe disease. In some patients, only these early lesions are found. The radiologic demonstration of these aphthoid ulcers for early diagnosis, facilitates differentiation between ulcerative and granulomatous colitis, and is important for planning appropriate therapy.

5059 REGIONAL ENTERITIS IN MONOZYGOUS TWINS. REPORT OF AN 11th CASE AND REVIEW OF THE LITERATURE. (Fre.) Morichau-Beauchant, M.; Matuchansky, C.; Dofing, J. L.; Yver, L.; Morichau-Beauchant, J. (Service de Gastroenterologie, Hotel-Dieu, F 86021 Poitiers, France). *Gastroenterol. Clin. Biol.* 1(10):783-788; 1977.

Crohn's disease was diagnosed in 32-yr-old monozygous twin brothers who had been living apart for the last 10 yr before the onset of the disease. This case is compared with 10 previously reported cases, and some new data are presented. No karyotype abnormalities, immune deficiency, or genetic diseases were found, while the "null" (non B, non T) lymphocyte count was increased in both cases. The role of common environmental factors appears limited, but cannot be ruled out completely. Genetic factors appear to have played a major role in these cases of familial Crohn's disease.

5060 RESPONSE TO SPECIFIC DRUG THERAPY IN CROHN'S DISEASE; EVALUATION BY RECTAL BIOPSY AND MUCOSAL CELL COUNTS [Abstract]. (Eng.) Korelitz, B. I.; Sommers, S. C. (Lenox Hill Hosp., New York, NY). *Gastroenterology* 72(5, Part 2):1083; 1977.

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PREFACE

GASTROENTEROLOGY ABSTRACTS and CITATIONS is a publication of the National Institute of Arthritis, Metabolism and Digestive Diseases. This specialized information medium has been initiated to fill an existing great need in the field of gastroenterology and to assist the Institute in meeting its obligations to foster and support laboratory and clinical research into the nature, causes, and therapy of diseases of the gastrointestinal tract. Publication GASTROENTEROLOGY ABSTRACTS and CITATIONS makes available citations of all current papers relevant to this field from medical journals published throughout the world. Approximately one-third of the citations dealing with the major aspects of gastroenterology have accompanying abstracts.

The issuing of GASTROENTEROLOGY ABSTRACTS and CITATIONS under the auspices of the National Institute of Arthritis, Metabolism, and Digestive Diseases will provide a much needed current awareness tool to scientists and will facilitate greater integration of research and clinical efforts in this field. The number and great diversity of publications in the area of gastroenterology makes it imperative that an appropriate service be available to investigators and practitioners so that they may be apprised of progress with a minimum of delay. Our aim is to provide the readers with a readily systematized compilation of current published work. The publication will provide the greatest usefulness if these interested investigators will contribute their ideas and comments for consideration whenever possible.

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NOTE

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LANGUAGE ABBREVIATIONS

Afrikaans	Afr.	Georgian	Geo.	Persian	Per.
Albanian	Alb.	German	Ger.	Polish	Pol.
Arabic	Ara.	Greek	Gre.	Portuguese	Por.
Armenian	Arm.	Hausa	Hau.	Pushto	Pus.
Azerbaijani	Aze.	Hebrew	Heb.	Rumanian	Rum.
Belorussian	Bel.	Hindi	Hin.	Russian	Rus.
Bengali	Ben.	Hungarian	Hun.	Serbian	Ser.
Bulgarian	Bul.	Icelandic	Ice.	Slovak	Slo.
Burmese	Bur.	Indonesian	Ind.	Slovene	Slv.
Chinese	Chi.	Interlingua	Int.	Spanish	Spa.
Croatian	Cro.	Italian	Ita.	Swahili	Swa.
Czechoslovakian	Cze.	Japanese	Jpn.	Swedish	Swe.
Danish	Dan.	Kirghiz	Kir.	Tagalog	Tag.
Dutch	Dut.	Korean	Kor.	Tamil	Tam.
English	Eng.	Latin	Lat.	Telugu	Tel.
Esperanto	Esp.	Latvian	Lav.	Thai	Tha.
Estonian	Est.	Lithuanian	Lit.	Turkish	Tur.
Finnish	Fin.	Marathi	Mar.	Ukranian	Ukr.
Flemish	Fle.	Masai	Mas.	Urdu	Urd.
French	Fre.	Multilingual	Mlt.	Vietnamese	Vie.
Gaelic	Gae.	Norwegian	Nor.	Welsh	Wel.

ABBREVIATIONS USED IN ABSTRACTS

ACTH	adrenocorticotropic hormone	ml, µl	milli-, microliter(s)
ADP	adenosine diphosphate	mm	millimeter(s)
AMP	adenosine monophosphate	mOsm	milliosmolar; milliosmeter(s)
amp	ampere	msec	millisecond(s)
ATP	adenosine triphosphate	mV	millivolt(s)
A	angstrom	min	minute(s)
BSP	sulfobromophthalein	MTD	maximum tolerated dose
C	degrees centigrade	NAD	nicotinamide adenine dinucleotide
cal	calories	NADH	reduced nicotinamide adenine dinucleotide
cc	cubic centimeter		
cm	centimeter(s)	NADP	nicotinamide adenine dinucleotidephosphate
dl	deciliter		
DNA	deoxyribonucleic acid	NADPH	reduced nicotinamide adenine dinucleotidephosphate
ED_{50}	median effective dose(s)		
EDTA	ethylenediamine tetraacetic acid	ng	nanogram (10^{-9})
e.g.	for example	nm	nanometer(s)
EEG	electroencephalogram	Pa	ambient pressure
ESR	erythrocyte sedimentation rate	PAS	periodic acid - Schiff
g	gram(s)	pg	picogram (10^{-12})
µg	microgram(s)	pgEq	picogram equivalent(s)
Hz	Hertz	p.o.	orally
hr	hour(s)	ppb	parts per billion
Ig	immunoglobulin(s)	ppm	parts per million
i.m.	intramuscular	r	Roentgen
i.p.	intraperitoneal	RBC	red blood cells (erythrocytes), red blood count
IU	international unit(s)		
i.v.	intravenous	resp.	respectively
kcal	kilocalorie(s)	RNA	ribonucleic acid
kg	kilogram(s)	s.c.	subcutaneous
K_m	Michaelis constant	sec	second(s)
LD_{50}	median lethal dose(s)	SGOT	serum glutamic-oxalacetic transaminase
LDH	lactic acid dehydrogenase		
m	meter(s)	SGPT	serum glutamic-pyruvic transaminase
M	molar; mole(s)		
mM	millimolar; millimole(s)	U	unit(s)
µM	micromolar; micromole(s)	UV	ultraviolet
ma	milliampere(s)	V	volt
mCi, µCi	milli-, microcurie(s)	WBC	white blood cells (leukocytes), white blood count
mEq	milliequivalent(s)		
mg	milligram(s)	yr	year(s)

PRE-CLINICAL SCIENCES

MORPHOLOGY, CELLULAR STRUCTURE AND HISTOCHEMISTRY

5067 THE ELECTRON MICROSCOPY OF NORMAL HUMAN OESOPHAGEAL EPITHELIUM. (Eng.) Hopwood, D.; Logan, K. R.; Bouchier, I. A. D. (Ninewells Hosp. and Medical Sch., Dundee DD2 1UB, Scotland). *Virchows Arch. B* [*Cell Pathol.*] 26(4):345-358; 1978.

Biopsy specimens from the endoscopically normal human esophagus were examined ultrastructurally to better understand the function of the esophageal epithelium and to compare it with other nonkeratinizing stratified squamous epithelium. Three layers were identified, as in light microscopy of the esophageal epithelium: basal, prickle, and functional cell layers. A continuous basement membrane separated the lamina propria from the basal cells. The basal cell membrane carried hemidesmosomes, desmosomes, and microvillous processes. Their cytoplasm contained the usual organelles plus free ribosomes and tonofibrils. Prickle cells contained glycogen rosettes and many tonofilaments, and their cell membranes had many microvillous and desmosomal processes, in places elaborated into desmosome fields. In both these layers, there was a wide intercellular space containing some particulate and membranous debris. The flattened cells of the functional layer had fewer desmosomes and microvilli but abundant glycogen and tonofilaments and a narrow intercellular space. Membrane-coating granules, first reaching a maximum in the functional cell layer, appeared in the upper prickle-cell layer, and a few persisted into the surface cells. The apical cell membrane of the most superficial cells was thickened and had few small microvillous processes, which were covered with a filamentous "fuzzy" coat. No keratohyaline granules were present. The papillae of the lamina propria contained capillaries, some with a fenestrated endothelium. The human esophageal epithelium is similar to other stratified squamous nonkeratinizing epithelia, presumably reflecting a similar wear-and-tear function. Some unique features of it not previously described are the desmosome fields, the lipid droplets, and the fenestration of the capillaries. The structure and distribution of the membrane-coating granules suggest that their contents are secreted into the intercellular space.

5068 THE SPIRAL CONSTRICTOR OF THE GASTROESOPHAGEAL JUNCTION. (Eng.) Jackson, A. J. (Wayne State Univ. Sch. Medicine, Detroit, MI 48201). *Am. J. Anat.* 151(2):265-275; 1978.

To determine the mechanism by which the normal gastroesophageal junction prevents gastric regurgitation, the gastroesophageal region was reconstructed from the histological analyses of five human neonates. In addition, the musculature of eight (3 newborn and 5 adult) human stomachs obtained from autopsies, with the lower one-third of the esophagus attached, was dissected with the aid of a binocular dissecting microscope. The muscularis mucosae, in the region of the gastroesophageal junction, exhibited no increase in thickness, nor was there any indication of special mucosal folds. In addition, the gastroesophageal junction contained no morphologic evidence to support the existence of an anatomic sphincter (a localized thickening of circular muscle fibers). However, the obliquely arranged inner circular muscle fibers of the esophagus separated into fascicular bundles below the esophageal opening. Some of the fasciculi, as they descended, again became circular in shape and continued into the stomach, forming the middle circular muscle layer, while other fasciculi maintained their oblique course toward the left surface of the esophagus. These fasciculi, coursing on the anterior and posterior surfaces of the esophagus, crossed and interdigitated along the left surface of the esophagus in the region of the incisura cardiaca. After crossing, the oblique fasciculi descended into the stomach forming the inner oblique muscle layer. Based upon this description of crossing and interdigitating fasciculi, it is suggested that closure of the gastroesophageal junction may be due to contraction of spirally arranged muscle. Since the term "sphincter" generally implies a circular structure, it is proposed that the term "spiral constrictor" be considered in naming this anatomical arrangement.

5069 A QUALITATIVE AND QUANTITATIVE MORPHOLOGIC STUDY OF PEYER'S PATCHES OF THE MOUSE. (Eng.) Abe, K.; Ito, T. (Hokkaido Univ. Sch. Medicine, Sapporo, 060 Japan). *Arch. Histol. Jpn.* 40 (5):407-420; 1977.

The morphology of Peyer's patches of adult mice was studied qualitatively and quantitatively by light microscopy, to determine whether they are functionally related to peripheral lymphatic tissues. The patch was seen to be topographically divided into four portions: germinal center, follicular area, parafollicular area, and dome area. The germinal center consisted of light and dark zones. The follicular area surrounded the germinal center, especially the light zone that had an apical pole directed toward the mucosal surface. The parafollicular area surrounded the follicular area and contained postcapillary venules with high endothelium. The dome area was situated just above the follicular area. The epithelium over the dome area was infiltrated with numerous lymphocytes. Quantitatively, the germinal center, follicular area, and parafollicular area were almost similar in volume (about 30% each), and the dome area constituted only a small portion (about 10%). The density of small lymphocytes was highest in the follicular area and lowest in the germinal center. Of the total small lymphocytes in the patch, 8.4% were included in the germinal center, 58.2% in the follicular area, 26.7% in the parafollicular area, and 3.8% in the dome area. Intraepithelial small lymphocytes were almost twice as abundant in the dome as in the villi. In the dome, almost half the intraepithelial lymphocytes were above the nuclear level of the epithelial cells, whereas in the villi 7.3% of intraepithelial lymphocytes were above the nuclear level. The results suggest that the functional structure of the Peyer's patch is similar to that of peripheral lymphatic tissues.

5070 THE CELLS OF THE RAT GASTRIC GROOVE AND CARDIA: AN ULTRASTRUCTURAL AND CARBOHYDRATE HISTOCHEMICAL STUDY, WITH SPECIAL REFERENCE TO THE FIBRILLOVESICULAR CELLS. (Eng.) Wattel, W.; Geuze, J. J. (Abelenlaan 4, Middleburg, Netherlands). *Cell Tissue Res.* 186(3):375-391; 1978.

The cells of the rat gastric groove and cardia, with particular reference to the fibrillovesicular cells (FVC), were studied using a carbohydrate histochemical stain, an extracellular space marker, ultrastructural stereoscopy, and ^{3}H-thymidine. The distal wall of the groove between the forestomach and glandular stomach is lined with a special type of columnar cell (CCGG) and with FVC. The cardiac glands contain cardiac mucous (CMC) and serous cells (CSC). The CCGG contain small mucous granules and special vesicles and tubules. The CMC are filled with large mucous granules and resemble mucous neck cells. The CSC are filled with large proteinaceous granules. The FVC are characterized by long microvilli, apical bundles of microfilaments and a complex "tubulovesicular system." The pattern of ^{3}H-thymidine incorporation and the presence of immature and transitional forms indicate a possible origin of all the cell types concerned from a common undifferentiated precursor. The membranes of the tubulovesicular system of FVC as well as the apical cell membrane were reactive to Thiery's carbohydrate stain. However, lanthanum tracing of the extracellular space and ultrastructural stereoscopy did not reveal a permanent continuity between both membrane systems. The absence of ^{3}H-thymidine label showed that FVC were not proliferative. The structural characteristics of FVC do not account for a secretory, resorptive, or receptive function. The special arrangement of microfilaments and the tubulovesicular system suggests an ability for fast changes in surface area.

5071 EFFECT OF BILATERAL NEPHRECTOMY ON ENDOCRINE CELLS OF RAT STOMACH. (Eng.) El Munshid, H. A.; Sundler, F.; Hakanson, R. (Dept. Physiology, Univ. Khartoum, Khartoum, Sudan). *Scand. J. Gastroenterol.* 12(7):849-856; 1977.

In an effort to discover why the histamine-storing endocrine-like cells in the oxyntic gland area of nephrectomized rats respond to the ensuing hypergastrinemia while the parietal cells do not, the morphological and ultrastructural effects of bilateral nephrectomy were investigated in the histamine-containing cells, gastrin (G) cells, and parietal cells of 16 adult male Wistar rats. The animals were sacrificed 18-48 hr after nephrectomy or sham-operation, and sections from the oxyntic and pyloric gland areas were taken for analysis. Under the fluorescence microscope, the enterochromaffin-like cells were reduced in number ($p<0.001$), corresponding to a significant lowering of gastric mucosal histamine content (from 60 µg to 48 µg, $p<0.001$). The number of enterochromaffin cells and G cells was not affected, nor was the 5-hydroxytryptamine (5-HT) content. Electron micrographs indicated that the two major cell populations comprising the histamine-containing enterochromaffin-like cells of the oxyntic mucosa, the A-like cells (with round, electron-dense cytoplasmic granules), and the ECL cells (with granules of vesicular appearance) were increased in size while the number of cytoplasmic granules per unit area was decreased following nephrectomy. G cells in the antrum became smaller while the number of cytoplasmic granules per unit area increased, and the parietal cells showed almost complete loss of canaliculi but numerous vehicles in the cytoplasm. These results support the theory that ECL and A-like cells are activated following nephrectomy while the parietal and G cells are deactivated.

5072 IMMUNOELECTRON CYTOCHEMICAL LOCALIZATION OF MOTILIN IN HUMAN DUODENAL ENTEROCHROMAFFIN CELLS. (Eng.) Heitz, P. U.; Kasper, M.; Krey, G.; Polak, J. M.; Pearse, A. G. E. (Dept. Pathology, Univ. Basel, Schonbeinstrasse 40, CH-4056 Basel, Switzerland). *Gastroenterology* 74(4):713-717; 1978.

The precise localization of motilin in the human duodenal mucosa was studied ultrastructurally. The 22-amino acid peptide motilin was localized exclusively in the duodenal type of enterochromaffin cell by immunoelectron microscopy. This cell was seen to occur predominantly in the duodenum and upper jejunum. It is concluded that at least two types of enterochromaffin cells exist in the human gut mucosa and that they produce at least one biogenic amine as well as two peptides. Therefore, they could provide a useful model for studies of the interrelationship of storage and release of amines and peptides.

5073 EFFECT OF ETHANOL ON THE MORPHOLOGY OF HAMSTER JEJUNUM. (Eng.) Fox, J. E.; McElligott, T. F.; Beck, I. T. (Queen's Univ., Hotel Dieu Hosp., Kingston, Ontario K7L 3H6, Canada). *Am. J. Dig. Dis.* 23(3):201-209; 1978.

To study the morphological effects of exposure of the jejunum to low ethanol concentrations, rat and hamster jejuna were perfused with 2.1-4.8% ethanol. Following 45 min of exposure, many of the villi of the hamster jejunum developed fluid-filled blisters. Perfusion with mannitol (150-1,050 mM) caused necrosis of the villus tips due to dehydration but no blister formation. The rat jejunum was less resistant to ethanol than was that of the hamster, and in this case, the blisters ruptured. The authors believe that the initial insult of the freely permeant ethanol is deep in the epithelium, resulting in accumulation of edema under the epithelium. Solutions of relatively inert substances are poor controls for experiments on ethanol-induced injury.

5074 AN IN VITRO STUDY OF PANCREATIC DUCTAL CELLS. (Eng.) Singh, M.; Parks, N. M.; Webster, P. D., III (Veterans Admin. Hosp., Augusta, GA 30904). *Proc. Soc. Exp. Biol. Med.* 157(1):23-28; 1978.

Since extensive metabolic or biochemical characterization of pancreatic ductal cells has not been carried out, selected metabolic parameters were examined in the pancreatic duct of fed and fasted rats after they were killed. The intact duct was isolated by dissection and opened longitudinally. Twelve ducts were pooled for each study. Fasting for 72 hr was associated with decreases in ^{14}C-glucose oxidation to $^{14}CO_2$ ($p<0.05$ in terms of protein, $p<0.005$ in terms of DNA) and alkaline phosphatase activity ($p<0.005$ in terms of protein, $p<0.05$ in terms of DNA). There were no changes with fasting in the following parameters: protein, RNA, or DNA content; ^{14}C-labeled amino acid incorporation into proteins; ^{14}C-glucose or ^{14}C-glucosamine incorporation into glycoproteins; and Mg^{2+}-ATPase, HCO_3^--ATPase, 5'nucleotidase, or leucine aminopeptidase activities. In contrast to acinar cells, duct cells did not actively synthesize proteins. This study points out that pancreatic duct cells are metabolically active and that fasting was associated with reductions in glucose oxidation and alkaline phosphatase activity. Whether these metabolic activities are under the control of gastrointestinal hormones remains to be determined.

5075 THE MORPHOLOGY OF THE GASTROINTESTINAL TRACT. (Eng.) Teague, R. H. (Bristol Royal Hosp., Bristol BS2 8HW, England). *Adv. Exp. Med. Biol.* 89:51-60; 1977.

5076 MAST CELL POPULATION IN STOMACH WALL WITH EXPERIMENTALLY INDUCED PEPTIC ULCER. (Eng.) Chatterjee, S.; Roy, P. R.; Dasgupta, S. R. (Univ. Coll. Medicine, Calcutta Univ., Calcutta, India). *Indian J. Exp. Biol.* 14:100-102; 1976.

5077 MORPHOFUNCTIONAL CONSIDERATIONS ON THE ELASTIC FIBERS OF THE TERMINAL ILEUM SEGMENT IN HUMAN NEWBORN. (Eng.) de Carvalho, C. A. F.; Faintuch, J. J.; Rodrigues Junior, A. J. (Faculdade de Medicina da Universidade de Sao Paulo, Av. Dr. Arnaldo, 455, 01246, Sao Paulo, Brazil). *Arq. Gastroenterol.* 14(3):131-134; 1977.

5078 MUCOSUBSTANCES IN THE NORMAL HUMAN OESOPHAGEAL EPITHELIUM: A COMPARISON OF PERIODIC ACID-SILVER AND PHOSPHOTUNGSTIC ACID TECHNIQUES. (Eng.) Hopwood, D.; Logan, K. R.; Milne, G. (Ninewells Hosp. and Medical Sch., Dundee DD2 1UB, Scotland). *Histochemistry* 54(1): 67-74; 1977.

5079 Escherichia coli IN THE FAECAL FLORA OF MAN. (Eng.) Hartley, C. L.; Clements, H. M.; Linton, K. B. (Medical Sch., Univ. Bristol, Bristol BS8 1TD, England). *J. Appl. Bacteriol.* 43(2):261-269; 1977.

5080 MICROBIAL EFFECTS ON MUCOSAL STRUCTURE AND FUNCTION. (Eng.) Abrams, G. D. (Univ. Michigan Medical Sch., Ann Arbor, MI 48109). *Am. J. Clin. Nutr.* 30(11):1880-1886; 1977.

5081 REVIEW OF LIGHT AND ELECTRON MICROSCOPY OF THE GASTRIC MUCOSA. (Fre.) Zeitoun, P. (U.E.R. de Medecine, B.P. 171, 51056 Reims-Cedex, France). *Ann. Gastroenterol. Hepatol.* 13(5):467-477; 1977.

5082 THE STRUCTURE OF THE GASTRIC MUSCULAR MEMBRANE IN DIFFERENT PARTS OF THE STOMACH. (Rus.) Dvoretskaja, M. G. (Dept. Anatomy, N. A. Semashko Moscow Medical Inst. Stomatology, Moscow, USSR). *Arkh. Anat. Gistol. Embriol.* 72(4): 25-32; 1977.

5083 NATURE AND SIGNIFICANCE OF CAJAL'S "INTESTINAL CELLS" IN THE ESOPHAGUS AND STOMACH OF MAN. (Ita.) Faussone Pellegrini, M. S.; Cortesini, C.; Romagnoli, P. (Istituto di Istologia ed Embriologia generale dell'Universita di Firenze, Florence, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(21):1764-1767; 1977.

5084 ULTRASTRUCTURAL PICTURE OF MYONEURAL JUNCTIONS IN THE HUMAN ESOPHAGUS AND STOMACH. (Ita.) Faussone Pellegrini, M. S.; Cortesini, C.; Romagnoli, P. (Istituto di Istologia ed Embriologia generale dell'Universita di Firenze, Florence, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(21):1768-1770; 1977.

5085 MORPHOLOGICAL AND FUNCTIONAL STUDY OF INTESTINAL VILLI. (Spa.) Martinez Ramos, C.; Romero Martinez, A. (Facultad de Medicina, Universidad Complutense, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(6):643-658; 1977.

5086 MORPHOFUNCTIONAL ANALYSIS OF THE CONDITION OF THE SMALL INTESTINE FOLLOWING SUBDIAPHRAGMATIC VAGOTOMY. (Rus.) Eletskii, Iu. K.; Tsibulevskii, A. Iu. (Dept. Histology, N. I. Pirogov Second Moscow Medical Inst., Moscow, USSR). *Eksp. Khir. Anesteziol.* (5):34-38; 1976.

5087 ANATOMIC-SURGICAL FOUNDATION OF DIRECTED LIVER RESECTION. (Ita.) Monti, G. F.; Sasso, F. (Istituto di Clinica Chirurgica dell' Universita, Trieste, Italy). *Minerva Med.* 68(31): 2159-2166; 1977.

See also, 5132, 5155, 5156, 5188, 5268, 5272, 5273,
5276, 5289, 5318, 5461, 5619, 5783, 5785.

5088 CAPACITY OF THE HUMAN COLON TO ABSORB FLUID.

(Eng.) Debongnie, J. C.; Phillips, S. F. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 74(4):698-703; 1978.

To measure the maximum amount of fluid that can be absorbed by the normal human colon, four healthy subjects were studied by metabolic balance. When, in addition to normal dietary intakes, 2 l/day of isotonic fluid were infused into the cecum, fecal weight increased 150%, but the frequency of stools increased only slightly. Fecal weight, percentage of water, and frequency increased more when the load of fluid infused into the cecum was 4 l/day and achieved values found in diarrhea. Under these circumstances, summing the estimated endogenous ileal flow (approximately 2 l/day) and the infused load, minus the fecal losses, a net maximum absorption of 5,700 ml of H_2O, 816 mEq of Na, and 44 mEq of K was calculated. In a second set of studies, chenodeoxycholate (approximately 4 g/day) was infused into the cecum, along with a fluid load of 4 l/day. Water and sodium absorptions were reduced to approximately 5,000 ml and 700 mEq, resp., and diarrhea occurred. Ursodeoxycholate administered in the same way did not alter stool composition or cause diarrhea. Infusion of a single bolus of 250 ml of fluid into the cecum did not alter stool composition; a bolus of 500 ml produced loose stools. Thus, the colon has a surprisingly large capacity to absorb fluid; this capacity is reduced by chenodeoxycholate and is overwhelmed if fluid enters the cecum rapidly. The approach of nonsteady state infusions into the cecum may be useful for the study of colonic function and diarrhea.

5089 TISSUE OSMOLALITY IN INTESTINAL VILLI DURING LUMINAL PERFUSION WITH ISOTONIC ELECTROLYTE SOLUTIONS.

(Eng.) Jodal, M.; Hallblack, D. A.; Lundgren, O. (Dept. Physiology, Univ. Goteborg, Goteborg, Sweden). *Acta Physiol. Scand.* 102 (1):94-107; 1978.

The hypothesis that a muscular countercurrent exchanger in the intestinal villi acts as a countercurrent multiplier that creates a hyperosmolar compartment necessary for water absorption in the absence of or against a lumen to plasma osmolality difference was examined using a cryoscopic technique. Tissue osmolality in the core of the intestinal villi of cats was determined in intestinal mucosa segments exposed to either Krebs-glucose, Krebs-mannitol, or cholin-mannitol, and then rapidly extirpated and frozen. Cross-sections of the intestinal wall were cut at different levels of the villi, and the tissue was subsequently thawed by perfusion to determine the tissue melting point (the point at which the last ice crystal melted, taken as a measure of the extracellular osmolality). The results of the melting experiments suggest that there is a region at the villous tip that has a considerably higher osmolality than that of the fluid perfusing the intestinal lumen or that of plasma and that there exists an osmolality gradient within the villus from its tip to its base. The gradient existed on both the jejunum and ileum. Increasing the intestinal blood flow by the intra-arterial administration of isopropylnorepinephrine (20 μg/ml) or making the intestine ischemic by clamping the intestinal vascular supply while supplying oxygen to the mucosa decreased tissue osmolality. Substituting all the sodium ions with choline in the luminal perfusate almost completely abolished the tissue hyperosmolality, and the intestine became a secretory organ. These results are consistent with the view that the observed villous tissue hyperosmolality was created by a countercurrent multiplication of sodium chloride. It is proposed that the hyperosmolar region represents the hyperosmotic compartment necessary for explaining intestinal water absorption.

5090 EXPERIMENTAL STUDIES ON FLUID PATHOPHYSIOLOGY IN SMALL INTESTINAL OBSTRUCTION IN THE RAT. II. EFFECTS OF INTRALUMINAL HYPEROSMOLALITY AND SIMULTANEOUS INTRAVENOUS INFUSIONS.

(Eng.) Johnson, L.; Nordstrom, H.; Nylander, G. (Karolinska Hosp., 104 01 Stockholm 60, Sweden). *Scand. J. Gastroenterol.* 13(1):113-122; 1978.

An experimental model for studying the flow of fluids across the mucosa of the small intestine was used to investigate the pathophysiology of simple obstructional ileus. A hyperosmolal glucose solution (3 ml, about 1,600 mOsm/kg) was introduced into the intestinal lumen of male albino Sprague-Dawley rats through a catheter inserted into an extraperitonealized 50-cm distal loop, and the effects of i.v. infusions (12 ml/hr) of hypo-osmolal (0.45% NaCl, about 145 mOsm/kg), iso-osmolal (0.90% NaCl, about 290 mOsm/kg), and hyperosmolal (30% of glucose, about 1,600 mOsm/kg) solutions on the extent and rate of the resulting intestinal fluid flux were examined. At the end of every 2-hr experimental period, the same volume of fluid had accumulated in all groups and there was a pronounced decrease in osmolality. At 60 min, the intraluminal osmolality had dropped to 500 mOsm/kg in the experimental groups. The final osmolality was 400 mOsm/kg in the experimental groups compared with 455 mOsm/kg in the controls. There was a linear increase in intraluminal pressure in the control, iso-osmolal, and hyperosmolal groups over the 2-hr period, but in the hypo-osmolal group, a peak was reached (30 cm of water) at 1 hr and maintained for the next hour. The final pressure was 40 cm of water in the control group but markedly higher in the iso-osmolal group. A very pronounced hemodilution took place in the hyperosmolal group, representing a hematocrit reduction of 25 U, during the first 30 min and continued at this level for the experimental period. Serum osmolality increased markedly in the control group, iso-osmolal group, and hyperosmolal group but did not increase in the hypo-osmolal group. A significant urinary production occurred only in the hyperosmolal group (12 ± 2.2 ml/hr), corresponding to the volume of infused glucose. In this experimental system, the same amount of fluid accumulated in the rat small intestinal lumen whether hypo- or iso-osmolal glucose was infused, suggesting that the flow of fluid into the lumen cannot be modified by giving parenteral solutions of any osmolality.

5091 EXPERIMENTAL STUDIES ON FLUID PATHOPHYSIOLOGY IN SMALL INTESTINAL OBSTRUCTION IN THE RAT. III. EFFECTS OF INTRALUMINAL ISO-OSMOLALITY AND SIMULTANEOUS INTRAVENOUS INFUSION.

(Eng.) Johnson, L.; Nordstrom, H.; Nylander, G. (Karolinska Hosp., 10401 Stockholm 60, Sweden). *Scand. J. Gastroenterol.* 13(2):235-240; 1978.

An experimental model was developed in rats to investigate the accumulation of fluid in the lumen during intestinal obstruction. An immobilized 50-cm loop of male albino rat ileum was extraperitonealized in 90 animals and 3 ml of an iso-osmolal polyethylene-glycol solution (PEG, 290-300 mOsm/kg) was introduced. Intraluminal pressure, blood pressure, urine output, serum osmolality, and blood hematocrit were monitored in three experimental groups in which a constant infusion pump was used to infuse solutions of different osmolality into the jugular vein at the rate of 12 ml/hr: (1) control (no infusion), (2) hypo-osmolal (0.45% NaCl, ≈145 mOsm/kg), and (3) iso-osmolal (0.90% NaCl, ≈290 mOsm/kg). The original volume in the loop, representing the 3 ml of PEG, was essentially unchanged by the i.v. infusions, and the osmolality of the intestinal contents was not changed in any group. However, there was a tendency to a reduction of the intestinal contents in the control group. There was no change in the intraluminal pressure, normal peristaltic activity, or normal blood pressure in any of the groups. No urine output occurred in any of the experiments. A slight but significant ($p<0.05$) hemoconcentration appeared at the end of the experiment in the control group. A significant ($p<0.05$) hemodilution occurred in the first hour in the iso- and hypo-osmolal groups; it was maintained in the hypo-osmolal group but returned to the original value in the iso-osmolal group during the next hour. When parenteral infusions of solutions in amounts equal per hour to total plasma volume were given, arterial and pulse pressures remained stable and blood volume showed only slight changes, measured as a change in the hematocrit. In the iso-osmolal group, the difference in blood volume at the end of the 2-hr experimental period (24 ml of fluid delivered) showed that only 5% of infused fluid remained in the blood, indicating that the rest was distributed to the extravascular space, which must then have an enormous storage capacity. In the hypo-osmolal group, the reduction in blood osmolality indicates that there is a reduction in the osmolality of both the extravascular space and the vascular compartment. It is concluded that the influx of fluid into the intestinal lumen in the presence of a hyperosmolal agent is due entirely to the intense osmotic strength of the solution and that large parenteral infusions of varying osmolality do not affect this accumulation.

5092 CHARACTERIZATION OF p-AMINOBENZOIC ACID TRANSPORT ACROSS THE RAT INTESTINE.

(Eng.) Arvanitakis, C.; Longnecker, M. P.; Folscroft, J. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *J. Lab. Clin. Med.* 91(3):467-472; 1978.

The intestinal absorption of para-aminobenzoic acid (PABA) was characterized *in vivo* and *in vitro* in the rat by the segmental intestinal perfusion and everted gut sac technique, and regional differences between jejunal and ileal absorption were examined. Net PABA absorption was directly proportional to substrate concentration, and saturation of absorption did not occur with increasing concentrations of PABA (1-50 mM), indicating a nonsaturable process. Jejunal and ileal absorption rates were similar and were not influenced by the presence of glucose or the absence of sodium in the test solution. Similarly, ^{14}C-PABA transport *in vitro* was nonsaturable and proportional to PABA concentration (0.05, 0.5, 1, 10, and 50 mM). It was not inhibited by ouabain or other PABA analogues such as folic acid and benzoic acid. These studies indicate that PABA, a vitamin B cofactor, is absorbed by a nonsaturable, sodium-independent process, which characterizes passive diffusion and is similar to the absorption of other vitamin B group members.

5093 TRANSPORT OF HETEROCYCLIC ACIDS ACROSS RAT SMALL INTESTINE IN VITRO.

(Eng.) Jackson, J. J.; Airall, A. A. (George Washington Univ., Medical Center, 2300 I St., N.W., Washington, DC 20037). *J. Membr. Biol.* 38(3):255-269; 1978.

The steady-state fluxes of barbituric acid, six of its substituted derivatives, and 5,5-dimethyloxazolidinedione (DMO) across the wall of rat jejunum was studied *in vitro*. For each of the compounds tested, the mucosal (M) to serosal (S) flux was significantly larger than the S to M flux. Both M to S and S to M fluxes increased linearly with concentration, and the transport of one acid was not influenced by the presence of a tenfold greater concentration of a second heterocyclic acid. The fluxes decreased as the pH of the incubation saline was increased, but neither the M to S, nor the S to M fluxes could be described in terms of simple nonionic diffusion. The relation between the flux ratios of the transported acids and their pK_a values could be described by an equation derived from consideration of the transport of a weak acid in a series three-compartment system, and it is concluded that the three-compartment system provides a good working hypothesis for the mechanism of heterocyclic acid transport across rat jejunum. The best fit of the theoretical curve to the experimental data was obtained when the ratio of permeabilities to the ionized and nonionized forms of a weak acid at one of the barriers was assigned the value 5×10^{-1}. It is suggested that this value may be characteristic of a noncellular restriction to diffusion, such as a layer of connective tissue, and substantiates previous suggestions that the intermediate compartment of the intestinal three compartment system is a component of the subepithelial extracellular space.

5094 GLUCOSE TRANSPORT BY BRUSH-BORDER MEMBRANE VESICLES AFTER PROXIMAL RESECTION OR ILEO-JEJUNAL TRANSPOSITION IN THE RAT.

(Eng.) Menge, H.; Murer, H.; Robinson, J. W. L. (Medizinische Universitatsklinik, D-3550, Marburg/Lahn, W. Germany). *J. Physiol. (Lond.)* 274:9-16; 1978.

To study the functional properties of the ileal mucosa and the mechanisms responsible for the adaptive response of the ileum following jejunal resection or interposition, glucose transport by brush border membrane vesicles was determined after proximal resection or ileo-jejunal transposition in female Wistar rats. Different intestinal regions were removed for the examination of membrane vesicles 4 weeks after operation. The ability of the brush border membranes to accumulate glucose was measured in the presence of a 100-mM NaSCN gradient as driving force, but in the absence of a Na^+ gradient. Vesicles from control ileum developed an overshoot uptake of glucose after 15 sec that was three to four times smaller than that of jejunal vesicles. This difference was also observed in membranes prepared from ileal loop mucosa following proximal resection or interposition in the jejunum. Jejunal vesicles disclosed a considerably smaller overshoot uptake of glucose following interposition below the ileum. The results indicate that the enhancement of the function of the ileum *in vivo* following proximal resection is due primarily to an increase in surface area (a result of the lengthening of villi and crypts due to hyperplasia) and not to any changes in the fundamental properties of the brush border membrane of the individual enterocytes.

5095 EFFECT OF ETHANOL ON GLUCOSE AND WATER ABSORPTION IN HAMSTER JEJUNUM IN VIVO. METHODOLOGICAL PROBLEMS: ANESTHESIA, NONABSORBABLE MARKERS, AND OSMOTIC EFFECT. (Eng.) Fox, J. E.; Bourdages, R.; Beck, I. T. (Hotel Dieu Hosp., Kingston, Ontario, Canada). *Am. J. Dig. Dis.* 23(3): 193-200; 1978.

The effect of ethanol (450-1,050 mM) on glucose and water absorption was studied in the *in vivo* hamster jejunum. In preliminary experiments, using sodium amytal anesthesia, control animals, whose jejunal segment was perfused without ethanol, required more anesthetic agent than did those perfused with ethanol. Thus, to allow for unbiased comparison of the absorption data between the two groups of animals, all absorption studies were carried out on conscious restrained hamsters. Ethanol did not influence the permeability of the jejunum to polyethylene glycol (PEG) and meglumine diatrizoate. In addition, ethanol did not influence the time required for the onset of steady-state absorption. Using both the gravimetric and the electrical methods, no measurable osmotic pressure exerted by ethanol (150-1,050 mM) on the hamster jejunum could be detected. In the absorption studies, perfusion of the jejunum with five increasing concentrations of ethanol (450-1,050 mM) appeared to cause a concentration-dependent depression in steady-state glucose transport. Water transport was depressed only when 4.8% (1,050 mM) ethanol was perfused. The effect of ethanol on the parameters studied is probably not related to the osmolality of the solution.

5096 PROTEIN DIGESTION AND ABSORPTION IN THE RAT. (Eng.) Curtis, K. J.; Kim, Y. S.; Perdomo, J. M.; Silk, D. B. A.; Whitehead, J. S. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *J. Physiol. (Lond.)* 274:409-419; 1978.

A randomly ^{14}C-labeled protein was synthesized, and the site and rate of digestion and absorption of dietary protein was investigated using this protein in a new method in the rat. A liquid test meal consisting of protein and a nonabsorbable marker, $^{51}CrCl_3$, was administered to rats sacrificed at intervals up to 4 hr after ingestion of the meal. Analysis of intestinal contents showed that as gastric emptying proceeded, the meal moved rapidly to the distal two-thirds of the small intestine. Protein digestion and absorption occurred predominantly in this area over a period of 1 to 2 hr. The amounts of endogenous protein present in the small intestine never exceeded the amounts of exogenous protein during maximum absorption of exogenous protein (0-1 hr). At later time periods (2-4 hr), however, more endogenous than exogenous protein was detected in the intestinal lumen. It is concluded that the digestion and absorption of dietary protein is a rapid process, taking place in the distal two-thirds of the small intestine. Endogenous protein levels do not exceed exogenous protein levels until after the bulk of exogenous protein is absorbed.

5097 EFFECT OF MEDICINAL SUBSTANCES ON INTESTINAL ABSORPTION. (Rus.) Frolkis, A. V.; Bushkova, R. K.; Lotakova, N. N.; Smolianskaia, L. I. (Propedeutic Dept. Internal Medicine, O. V. Kuusinen Petrozavodsk Univ., Petrozavodsk, USSR). *Klin. Med. (Mosk.)* 55(6):76-83; 1977.

5098 TRANSPORT THROUGH THE MEMBRANE OF INTESTINAL CELLS. (Pol.) Krawczyk, M. (Klinika Chirurgii Ogolnej i Plastycznej AM, ul. Banacha 1a, 02-097 Warsaw, Poland). *Pol. Tyg. Lek.* 32(40): 1575-1576; 1977.

5099 INVESTIGATION OF THE EFFECTS OF VEGETABLE HYDROCOLLOIDS (GUMS) ON INTESTINAL RESORPTION IN EXPERIMENTAL ANIMALS. (Ger.) Forster, H.; Hoos, I. (Zentrum der Biologischen Chemie der Universitat, Theodor-Stern-Kai 7, 6000 Frankfurt/M., W. Germany). *Z. Ernaehrungswiss.* 16(2):140-149; 1977.

5100 DIFFERENTIATION BETWEEN MORBID AND INVOLUTIVE CHANGES IN ENTERAL RESORPTION. COMMUNICATION 2: INVOLUTIVE CHANGES IN ENTERAL RESORPTION. (Ger.) Weiner, R.; Laue, R.; Dietze, F.; Schone, D.; Weiner, C. (I. Chirurgische Klinik des Bezirkskrankenhauses St. Georg Leipzig, Strasse der DSF 141, DDR-7021 Leipzig, E. Germany). *Dtsch. Gesundheitsw.* 32(31):1441-1446; 1977.

5101 VARIATIONS IN THE INTESTINAL ABSORPTION OF GLUCOSE AS A FUNCTION OF AGE. (Ita.)

Angioy, A. M.; Carbini, L.; Padalino, A. (Istituto di Fisiologia Umana dell'Universita di Cagliari, Cagliari, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(21):1778-1781; 1977.

5102 ACTIVE TRANSPORT OF GLUCOSE IN THE SMALL INTESTINE UNDER VARIOUS SURGICAL CONDITIONS. (Rus.) Popov, V. A.; Tuchin, S. V.; Shvyrev, N. I. (Second Surgical Clinic Postgraduate Studies, S. M. Kirov Military Medical Acad., Leningrad, USSR). *Eksp. Khir. Anesteziol.* (5):38-41; 1976.

5103 VARIATIONS IN THE INTESTINAL ABSORPTION OF XYLOSE AS A FUNCTION OF AMBIENT TEMPERATURE. (Ita.) Ciampolini, M. (Istituto di Clinica Pediatrica dell'Universita di Firenze, Florence, Italy). *Minerva Pediatr.* 29(10):687-692; 1977.

5104 VARIATIONS IN INTESTINAL ABSORPTION. II. AGE: ORAL LOAD CURVES WITH XYLOSE. (Ita.) Ciampolini, M.; Adami-Lami Conti, C.; Muzzarelli, D.; Falcini, F. (Istituto di Clinica Pediatrica dell'Universita di Firenze, Florence, Italy). *Minerva Dietol. Gastroenterol.* 23(2):67-70; 1977.

5105 VARIATIONS IN INTESTINAL ABSORPTION. III. ENVIRONMENTAL TEMPERATURE: BLOOD AND URINE XYLOSE LEVELS AFTER AN ORAL TEST IN CHILDREN AND ADULT VOLUNTEERS KEPT AT DIFFERENT TEMPERATURES. (Ita.) Ciampolini, M.; Muzzarelli, D. (Istituto di Clinica Pediatrica dell'Universita di Firenze, Florence, Italy). *Minerva Dietol. Gastroenterol.* 23(2):71-78; 1977.

5106 FACTORS INFLUENCING THE ENTEROHEPATIC DIGITOXIN CIRCULATION IN HUMANS. (Ger.) Sattler, R. W.; Schmiedeberg, W.; Seiler, K. U. (Abteilung Pharmakologie, Christian-Albrechts-Universitat, Hospitalstrasse 4-6, 2300 Kiel, W. Germany). *Arzneim. Forsch.* 27(II, 8):1615-1617; 1977.

5107 IRON ABSORPTION IN THE ELDERLY [Abstract]. (Dut.) Marx, J. J. M. (No affiliation given). *Ned. Tijdschr. Geneeskd.* 121(28):1157; 1977.

5108 ABSORPTION OF VITAMIN B_1. IV. LEVELS OF SH-GROUPS IN INTESTINAL MUCOSA AND ABSORPTION OF ^{35}S-THIAMINE. (Fre.) Lazarov, I. (Institut de Recherches Zootechniques, Kostinbrod-Sofia, Bulgaria). *Acta Vitaminol. Enzymol.* 30(4/6):117-122; 1976.

5109 ABSORPTION OF VITAMIN B_1. V. EFFECT OF A MALE SEXUAL GLAND EXTRACT AND OF 4,4-DIOXYDIPHENYLBEXANE ON THE INTESTINAL ABSORPTION OF THIAMINE. (Fre.) Lazarov, I. (Institut de Recherches Zootechniques, Kostinbrod-Sofia, Bulgaria). *Acta Vitaminol. Enzymol.* 30(4/6):123-129; 1976.

5110 THE EFFECT OF LIPIDS ON TAUROCHOLATE ABSORPTION FROM SMALL INTESTINE IN THE RAT IN VIVO [Abstract]. (Eng.) Roy, C. C.; Lefebvre, D.; Belanger, G.; Chartrand, L.; Weber, A. (Ste-Justine Hosp., Montreal, Quebec, Canada). *Clin. Res.* 25(5):689A; 1977.

5111 THE EFFECT OF VERAPAMIL ON INTESTINAL CALCIUM TRANSPORT. (Eng.) Wrobel, J.; Michalska, L. (Medical Sch., ul. Debinski 1, 80-211 Gdansk, Poland). *Eur. J. Pharmacol.* 45(4): 385-387; 1977.

5112 THE EFFECT OF CALCIUM RESTRICTION IN THE DIET ON CALCIUM TRANSPORT IN RAT SMALL INTESTINE. (Eng.) Michalska, L.; Wrobel, J.; Szczepanska-Konkel, M. (Medical Sch., ul. Debinski 1, 80-210 Gdansk, Poland). *Acta Biochim. Pol.* 23(2/3):109-114; 1976.

5113 SODIUM-COUPLED SOLUTE TRANSPORT BY SMALL INTESTINE: A STATUS REPORT. (Eng.) Schultz, S. G. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Am. J. Physiol.* 233(4): E249-E254; 1977.

5114 INTESTINAL ABSORPTION OF AMINO ACIDS AND PEPTIDES. (Eng.) Matthews, D. M. (Westminster Hosp., 124 Vauxhall, Bridge Rd., London SW1V 2RH, England). *Z. Ernaehrungswiss.* 20(Suppl.): 1-7; 1977.

5115 ABSORPTION OF AMINO ACIDS AND PEPTIDE MEALS IN NORMAL HUMAN SUBJECTS. (Eng.) Silk, D. B. A. (St. Bartholomew's Hosp., West Smithfield, London EC1A 7BE, England). *Z. Ernaehrungswiss.* 20(Suppl.):24-31; 1977.

5116 EFFECT OF ENTERIC MICRO-ORGANISMS ON INTESTINAL SUGAR AND FATTY ACID ABSORPTION. (Eng.) Burke, V.; Houghton, M.; Gracey, M. (Princess Margaret Children's Medical Res. Foundation, Perth, Western Australia, Australia). *Aust. J. Exp. Biol. Med. Sci.* 55(Part 4):423-429; 1977.

5117 AGE-DEPENDENT INTESTINAL ABSORPTION. A PHARMACOKINETIC STUDY USING D(+)-XYLOSE [Abstract]. (Eng.) Heimann, G.; Roth, B. (Children's Hosp., Cologne, W. Germany). *Pediatr. Res.* 11(9, Part 2):1013; 1977.

5118 DIPEPTIDE MIGRATION--A GENERAL PRINCIPLE OF THE CELL MEMBRANE [Abstract]. (Eng.)

Nutzenadel, W.; Scriver, C. R. (No affiliation given). *Acta Pediatr. Belg.* 29(2):134; 1976.

5119 LACK OF EFFECT OF 13-NORLEUCINE MOTILIN ON NET CALCIUM UPTAKE OF ISOLATED RABBIT DUODENAL MUSCLE [Abstract]. (Eng.) Ruppin, H.; Mayer, C. J.; Domschke, W.; Wunsch, E.; Demling, L. (Dept. Physiology, Univ. Munich, Munich, Germany). *Gastroenterology* 72(5, Part 2):1123; 1977.

See also, 5128, 5259, 5267, 5319, 5563, 5576, 5806.

MOTILITY

5120 CHARACTERISTIC MOTOR ACTIVITY OF THE GASTROINTESTINAL TRACT IN FASTED CONSCIOUS DOGS MEASURED BY IMPLANTED FORCE TRANSDUCERS. (Eng.) Itoh, Z.; Takeuchi, S.; Aizawa, I.; Takayanagi, R. (Gunma Univ. Sch. Medicine, Maebashi 371, Japan). *Am. J. Dig. Dis.* 23(3):229-238; 1978.

Gastrointestinal contractile activity from the gastric body to the terminal ileum was continuously recorded in conscious dogs for several weeks by means of chronically implanted strain-gauge force transducers. The 24-hr changes in the gastrointestinal contractile activity consisted of two different major patterns, the digestive and interdigestive patterns. In the interdigestive state, a cyclic, recurring, caudad-moving band of strong contractions starting in the stomach and the duodenum and traversing the entire length of the small intestine was observed. When one band of strong contractions reached the distal ileum, another developed in the stomach and the duodenum again and propagated in a caudad direction. Such recycling episodes interrupted by long-lasting quiescence repeatedly occurred until the next meal. These characteristic contractile activities are identical with the interdigestive myoelectric complex of the stomach and the small bowel reported by other authors. The four sequential phases (I-IV) of the migrating myoelectric complex previously defined in terms of action potential activity, seem to correspond to the resting (quiescence) stage, preceding irregular contractions, strong contractions, and subsiding contractions observed in the present study.

5121 A CIRCUMFERENTIALLY-SENSITIVE MINIATURE PRESSURE SENSOR FOR STUDY OF HUMAN ESOPHAGEAL MOTILITY. (Eng.) Kaye, M. D.; Showalter, J. P.; Rock, K. C.; Johnson, E. (Gastroenterology Unit, Univ. Vermont, Burlington, VT). *Med. Res. Eng.* 12(5):10-15; 1977.

A circumferentially sensitive sensor (MT) that consists essentially of a miniature transducer mounted within a sealed fluid-filled chamber, surrounded by a pressure-sensitive silastic diaphragm, for studying human esophageal motility is described. This device is accurate and sensitive. Its use was compared in 10 young healthy men with a standard perfused catheter system (PC) composed of three catheters, whose side openings were at the same axial level, connected to external transducers. Pressures recorded from the lower esophageal sphincter were significantly higher with the MT than with the PC ($p<0.02-0.001$). In the upper esophageal sphincter, the rapid pressure changes associated with deglutition were far more faithfully reproduced with the MT. Contractile pressures recorded after swallowing from the body of the esophagus were similar with the two systems, provided that catheters were perfused at a rapid rate (approximately 8 ml/min for each catheter). This preliminary evaluation indicates that this MT has significant advantages as compared with currently available systems.

5122 INTERDIGESTIVE MOTOR ACTIVITY OF THE LOWER ESOPHAGEAL SPHINCTER IN THE CONSCIOUS DOG. (Eng.) Itoh, Z.; Honda, R.; Aizawa, I.; Takeuchi, S.; Hiwatashi, K.; Couch, E. F. (Gunma Univ. Sch. Medicine, Maebashi 371, Japan). *Am. J. Dig. Dis.* 23(3):239-247; 1978.

Simultaneous measurements of motor activity in the lower esophageal sphincter (LES) and the stomach were recorded continuously for several weeks by means of chronically implanted force transducers in five conscious dogs. The LES contracted precisely in association with the gastric body during the interdigestive state. During this time, a series of simultaneous contractions arose in the LES, gastric body, and antrum; these contractions lasted for 25 ± 2.1 min and then stopped abruptly. This active period was followed by a long period of motor quiescence (78 ± 3.6 min). These cyclic recurring episodes of contractions in the LES and the stomach continued until the next meal. These findings suggest that the interdigestive contractions in the LES act as the orad seal of the stomach during the interdigestive contractions and thus prevent the reflux of the gastric contents into the esophagus during this period.

5123 LOWER OESOPHAGEAL SPHINCTER RESPONSE TO GASTRIN--PHARMACOLOGICAL OR PHYSIOLOGICAL? (Eng.) Henderson, J. M.; Lidgard, G.; Osborne, D. H.; Carter, D. C.; Heading, R. C. (Univ. Edinburgh Medical Sch., Edinburgh, Scotland). *Gut* 19(2):99-102; 1978.

To determine whether gastrin is a physiological determinant of lower esophageal sphincter (LES) pressure, the response of the LES to endogenous gastrin release, produced by the intragastric instillation of protein, was assessed in 10 healthy volunteers. Sphincter pressures were measured by a rapid pull-through technique, and serum gastrin concentrations during each test were determined by radioimmunoassay. Despite stimulation of gastrin release by protein instillation, no significant change in LES pressure was observed. However, i.v. pentagastrin (0.25 and 0.5 µg/kg) administration produced an immediate increase in sphincter pressure, which then returned to the basal level within 4 min. Thus, although pentagastrin is an effective pharmacological stimulant of the sphincter, endogenous gastrin appears not to be a physiological determinant of LES pressure in man.

5124 EFFECTS OF HISTAMINE ON THE LOWER ESOPHAGEAL SPHINCTER IN VIVO: EVIDENCE FOR ACTION AT THREE DIFFERENT SITES. (Eng.) Rattan, S.; Goyal, R. K. (Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *J. Pharmacol. Exp. Ther.* 204(2):334-342; 1978.

The mechanism of the inhibitory effect on the lower esophageal sphincter was investigated in anesthetized opossums. The i.v. or intra-arterial (i.a.) administration of histamine (10 µg/kg) caused a transient rise, followed by a longer-lasting fall in the lower esophageal sphincter pressure (LESP). The i.v. dose of histamine produced an increase of 40.0 ± 13.5 mm Hg, followed by a fall of 72.7 ± 12.6 mm Hg. 2-Methylhistamine also produced a similar biphasic effect on i.v. or i.a. administration; the maximal rise in lower esophageal sphincter pressure was seen with a dose of 5 µg/kg, and a maximal fall occurred with 10 µg/kg. Tetrodotoxin (10 µg/kg) abolished the inhibitory effect and enhanced the excitatory effect of histamine or 2-methylhistamine on the LESP. Pyrilamine (5 mg/kg) abolished the excitatory and inhibitory effects of 2-methylhistamine. Pyrilamine also abolished the excitatory effect and antagonized the inhibitory effect of histamine. 4-Methylhistamine (250 µg/kg) caused a fall in the LESP, which was not influenced by tetrodotoxin. Metiamide (2 mg/kg) antagonized the effect of 4-methylhistamine and the inhibitory effect of histamine, which was resistant to antagonism by pyrilamine. The i.a. administration of a liberator of endogenous histamine, compound 48/80 (8 µg/kg), produced effects similar to those of exogenous histamine. These studies suggest that histamine can act on three different sites to modify the LESP. Stimulation of H_1 receptor on the sphincter muscle causes contraction, and activation of H_1 receptor on intramural inhibitory neurons causes inhibition of the sphincter. Activation of H_2 receptor on the sphincter muscle causes inhibition of the sphincter.

5125 RELATIVE ROLE OF PYLOROPLASTY SIZE, TRUNCAL VAGOTOMY, AND MILK MEAL VOLUME IN CANINE GASTRIC EMPTYING. (Eng.) Hinder, R. A.; Bremner, C. G. (Univ. Witwatersrand, Medical Sch., Hospital St., Hillbrow, Johannesburg, 2001, South Africa). *Am. J. Dig. Dis.* 23(3):210-216; 1978.

The gastric emptying of 10-, 20-, or 40-ml/kg milk meals was measured before and after Heineke-Mikulicz pyloroplasty of 3, 5, or 7 cm (6 dogs) or truncal vagotomy (3 dogs), to compare their relative effects on gastric emptying. The pyloroplasty group underwent vagotomy; following that, the tests were repeated. Initial gastric emptying (in the first 10 min) was increased in comparison with the preoperative period, after 5- and 7-cm pyloroplasties ($p<0.01$) and particularly after vagotomy with all sizes of pyloroplasty ($p=0.001$). Regardless of the volume of meal used, after vagotomy and pyloroplasty there was a 51-63% decrease in intragastric volume within the first 10 min. Increased duodenogastric reflux occurred in those dogs who showed rapid initial gastric emptying. After the first 10 min, all groups were shown to have virtually normal gastric emptying, except the truncal vagotomy group in which gastric emptying was delayed ($p<0.05$). It is the combination of pyloroplasty with vagotomy that is required to produce the very rapid initial gastric emptying of a liquid meal following vagotomy with pyloroplasty. It is concluded that two mechanisms control the gastric emptying of a milk meal. The first acts quickly, is dependent on an intact pylorus, and is influenced by the intragastric volume. The second is a more slowly acting mechanism, requiring up to 10 min to have its effect, and is not dependent on an intact pylorus or the intragastric volume. After vagotomy and pyloroplasty, the speed of gastric emptying in the first 10 min is proportional to the original meal volume, and therefore the therapy of postvagotomy diarrhea and dumping with small frequent meals seems rational.

5126 THE SLOWING OF GASTRIC EMPTYING BY PROTEINS IN TEST ANIMALS. (Eng.) Burn-Murdoch, R. A.; Fisher, M. A.; Hunt, J. N. (Guy's Hosp. Medical Sch., London SE1 9RT, England). *J. Physiol. (Lond.)* 274:477-485; 1978.

Experiments were carried out in nine healthy subjects to determine the effect of proteins in test meals on gastric emptying and to test the proposal that isocaloric concentrations of carbohydrate, fat, and protein in food would equally slow gastric emptying in humans. Test solutions containing either glucose, casein, partially hydrolyzed gelatin, or egg albumin (native or denatured) at concentrations up to 50 g/l in 33 mM trisodium citrate solution were given by gastric tube in volumes of 600 or 750 ml. The volume of the test solution recovered from the stomach after 20 min was measured. The greater the concentration of solute, the greater was the volume of the test solution recovered. All proteins slowed gastric emptying. Gram for gram, gelatin hydrolysate was equivalent to glucose in slowing gastric emptying. Casein was slightly more effective than glucose, and native egg albumin was significantly less effective than glucose ($p<0.01$). The authors conclude that the products of patient hydrolysis stimulated osmoreceptors in the walls of the duodenum. The results support the suggestion that food proteins contribute to the slowing of gastric emptying in such a way that isocaloric amounts of carbohydrate and mixed protein have the same effect. There was a strong correlation in each subject between the concentration of glucose giving a recovery of 400 ml and the corresponding concentration of casein, but there was no such relationship for gelatin hydrolysate. It is concluded that the between-subject variability in the digestion of casein was small, while that for gelatin hydrolysate was large.

5127 EVALUATION OF A MAGNETIC METHOD FOR THE MEASUREMENT OF SMALL INTESTINAL TRANSIT TIME.

(Eng.) Benmair, Y.; Fischel, B.; Frei, E. H.; Gilat, T. (Weizmann Inst. Science, Rehovot, Israel). *Am. J. Gastroenterol.* 68(5):470-475; 1977.

A recently reported method for the measurement of small intestinal transit time was evaluated in 29 subjects, 20 of whom had no disease that could affect motility. An externally applied magnetic transducer senses the presence of an ingested ferromagnetic material (50 g of magnesium ferrite dispersed in a test meal) upon its arrival at the cecal area. The method was compared to the commonly used x-ray method and good correlation between results from the two methods was found in 24 of 28 studies. The mean transit time in the 20 normal subjects was 157.5 ± 63.9 min. In the nine patients with various diseases, the transit times were as follows: diabetes mellitus, 110-170 min; duodenal ulcer, 90 min; gastric ulcer, 195 min; reflux esophagitis, 110 min; ulcerative colitis, 190 min; liver abscess, 148 min; and cholecystectomy, 140 min. This method may be useful in determining intestinal transit times in various diseases. The advantages of the method are that it does not involve any radiation, it is noninvasive, it is inexpensive when compared to x-ray equipment, the instrumentation is simple and mobile, and it may be used in conjunction with x-rays.

5128 SIMULTANEOUS MEASUREMENT OF THE PROPULSION AND MIXING OF SMALL BOWEL CONTENTS IN THE RAT.

(Eng.) Gustavsson, S.; Jung, B.; Nilsson, F. (Univ. Hosp., Uppsala, Sweden). *Acta Chir. Scand.* 143(6):359-364; 1977.

A method for the simultaneous measurement of propulsion and mixing of small bowel contents in conscious rats is described. Through a permanent duodenal catheter, ^{125}I- and ^{131}I-labeled polyvinylpyrrolidone (PVP) are infused continuously one after the other. The radioactive label is changed once during the total infusion period of 5 hr. Studies were performed in six groups of animals that differed with respect to time for interchange of test substance. At the end of the total infusion period, the border zone had travelled to six different locations in the small bowel. The animals that difkilled, and the two radioactivities were recorded from the excised bowel specimen. The resulting activity densities along the small bowel had clear peaks, and the overlap between the two labels in the border zone was minute, indicating that the intestinal contents were transported in isolated portions with only minor exchange of luminal contents between adjacent regions. The transport apparently proceeded steadily in a mainly aboral direction with no indications of abrupt changes in transport velocity.

5129 RICINOLEIC ACID EFFECT ON THE ELECTRICAL ACTIVITY OF THE SMALL INTESTINE IN RABBITS.

(Eng.) Mathias, J. R.; Martin, J. L.; Burns, T. W.; Carlson, G. M.; Shields, R. P. (Veterans Admin. Hosp., Gainesville, FL 32602). *J. Clin. Invest.* 61 (3):640-644; 1978.

Since both cholera toxin and ricinoleic acid may share common mechanisms regarding secretion, the hypothesis that they may both have a similar effect on motility was tested. Using myoelectric recording techniques, the myoelectric effects of castor oil, ricinoleic acid (*cis* isomer), and ricinelaidic acid (*trans* isomer) were examined in the small intestine of New Zealand white rabbits. Ricinoleic acid (2 μg/kg/min, 6 mM), was perfused into a distal 12-cm ileal loop. An abnormal myoelectric pattern developed that was similar to the alteration in the electrical activity that has previously been reported for cholera enterotoxin. Castor oil (0.85 ml/kg) had a similar effect. Ricinelaidic acid (2 μg/kg/min) induced no activity. A second preparation consisted of an intraluminal perfusion of ricinoleic acid (2 μg/kg/min) into the first section of the duodenum. The abnormal myoelectric pattern was observed in the jejunum and the ileum but not in the duodenum. The mean onset time for the development of this altered myoelectric state for all experiments was 3.5 hr. These studies suggest that an active motility component in addition to the secretory state exists throughout the small intestine that is exposed to castor oil or ricinoleic acid.

5130 MOTOR EFFECT OF DOPAMINE ON HUMAN SIGMOID COLON: EVIDENCE FOR SPECIFIC RECEPTORS.

(Eng.) Lanfranchi, G. A.; Marzio, L.; Cortini, C.; Osset, E. M. (Clinica Medica I, Ospedale S. Orsola, 40100 Bologna, Italy). *Am. J. Dig. Dis.* 23(3):257-263; 1978.

The effect of dopamine on human sigmoid motility was studied in 23 subjects affected by irritable bowel, idiopathic constipation, or chronic ulcerative colitis, and in 3 normal subjects. To record mechanical activity of the sigmoid colon, two small, air-filled balloons mounted on a probe introduced through a sigmoidoscope were used. The recordings were made at a distance of 25 and 15 cm from the anal edge. Dopamine (1, 5, 10, or 20 μg/kg/min) was infused for 10 min after a 30-min control infusion of physiologic solution. The motor response to dopamine was characterized by an increased baseline pressure with plastic waves superimposed. Dopamine produced a significant response at the dose of 5 μg/kg/min ($p<0.05$). Alpha and beta antagonizing agents failed to oppose the effect of dopamine, while anticholinergic drugs enhanced its motor action. These studies suggest that dopamine may stimulate the motor function of human large bowel through specific receptors.

5131 ADEQUATE MANOMETRIC METHOD FOR THE ESOPHAGUS AND ITS LOWER SPHINCTER. (Ger.) Kunath, U. (Zentrum der Chirurgie, Johann-Wolfgang-Goethe-Universitat, Theodor-Stern-Kai, D-6000 Frankfurt Am Main, W. Germany). *Chirurg* 47(9):477-481; 1976.

5132 NEURONAL ACTIVITY OF THE SUBMUCOSAL PLEXUS OF THE INTESTINE. (Rus.) Nozdrachev, A. D.; Vataev, S. I.; Sanin, G. Iu. (I. P. Pavlov Inst. Physiology, USSR Acad. Medical Sciences, Leningrad, USSR). *Dokl. Akad. Nauk SSSR* 237(4): 984-986; 1977.

5133 THE EFFECT OF ALTERED INTESTINAL TRANSIT TIME ON BILE ACID ENTEROHEPATIC CIRCULATION IN MAN [Abstract]. (Eng.) Hardison, W. G.; Tomaszewski, N.; Grundy, S. M. (Veterans Admin. Hosp., San Diego, CA). *Gastroenterology* 72(5, Part 2):1183; 1977.

5134 EFFECT OF SORMANTOL ON INTESTINAL MOTOR ACTIVITY. (Rus.) Nepokoichitskii, E. O.; Belenkov, A. V. (Clinic Hosp. Surgery, Vitebsk Medical Inst., Vitebsk, USSR). *Khirurgiia* (1):110-112; 1978.

5135 CHANGES IN INTESTINAL PERISTALSIS INDUCED BY THE PERITONEAL FLUID OBTAINED DURING EXPERIMENTAL INTESTINAL OBSTRUCTION. (Rus.) Chakyrov, S. N. (Inst. Hematology Blood Transfusion, Sofia, Bulgaria). *Eksp. Khir. Anesteziol.* (5):41-43; 1976.

5136 CHANGES IN THE POSITION OF THE ASCENDING COLON IN MALE GOTTINGER MINIATURE SWINE IN THE LIGHT OF LEFT LAPAROTOMY. (Ger.) Waibl, H. (Lehrstuhl fur Makroskopische Anatomie der Tiere, Universitat Munchen, Veterinarstrasse 13, D-8000 Munich 22, W. Germany). *Z. Versuchstierkd.* 19(1/2): 85-92; 1977.

5137 ELECTROMOTOR ACTIVITY OF THE STOMACH AND SMALL INTESTINE CAUSED BY STRANGULATION OBSTRUCTION OF THE INTESTINE. (Rus.) Groisman, S. D.; Lukatskii, R. A.; Plotkin, E. L. (Dept. Pharmacology and Experimental Pathology of the Digestive Tract, Kiev Univ., Kiev, USSR). *Patol. Fiziol. Eksp. Ter.* 4:45-50; 1976.

5138 STUDY OF TOTAL GASTRIC EMPTYING WITH BARYTA PEARLS. (Spa.) Laudano, O. M. (Hospital Nacional Centenario, Rosario, Argentina). *Rev. Esp. Enferm. Apar. Dig.* 51(4):405-414; 1977.

5139 ACTION OF CCK UPON GALLBLADDER MOTRICITY [sic] AND BILIARY EVACUATION IN RABBIT. ELECTROMYOGRAPHICAL STUDY [Abstract]. (Eng.) Sarles, J. C.; Rabaud, D. (Centre Hospitalier d'Aubagne, Service de Chirurgie Universitaire, Aubagne, France). *Eur. Surg. Res.* 9(Suppl. 1):174; 1977.

5140 THE CONSTRUCTION OF IMPLANTABLE STRAIN-GAUGE TRANSDUCERS [Abstract]. (Eng.) Rayner, V. (Rowett Res. Inst., Bucksburn, Aberdeen AB2 9SB, Scotland). *J. Physiol. (Lond.)* 273(2): 1P-2P; 1977.

5141 STOMACH MOTILITY IN THE PIG BEFORE AND AFTER VAGOTOMY [Abstract]. (Eng.) Rayner, V. (Rowett Res. Inst., Bucksburn, Aberdeen AB2 9SB, Scotland). *J. Physiol. (Lond.)* 273(2): 73P-74P; 1977.

5142 ACTIVATION OF GASTRO-INTESTINAL SMOOTH MUSCLE INDUCED BY THE CALCIUM IONOPHORE A23187. (Eng.) Mandrek, K.; Golenhofen, K. (Physiologisches Institut der Universitat Marburg, Deutschhausstrasse 2, D-3550 Marburg/Lahn, W. Germany). *Pfluegers Arch.* 371(1/2):119-124; 1977.

5143 EFFECTS OF MEAL SIZE ON POSTPRANDIAL LOWER ESOPHAGEAL SPHINCTER PRESSURE (LESP). (Eng.) Maher, J. W.; Crandall, V.; Woodward, E. R. (Univ. Florida Coll. Medicine, Gainesville, FL). *Surg. Forum* 28:342-344; 1977.

5144 GASTRO-INTESTINAL TRANSIT TIME AND SERUM LIPID LEVELS IN BLACK SCHOOLCHILDREN. (Eng.) Walker, A. R. P.; Gajjar, D. (South African Inst. Medical Res., Johannesburg, South Africa). *S. Afr. Med. J.* 52(17):677-679; 1977.

5145 GASTRIC EMPTYING RATE CONSTANTS AFTER ORAL ADMINISTRATION OF DRUG SOLUTION TO MICE, RATS, AND RABBITS. (Eng.) Watanabe, J.; Okabe, H.; Ichihashi, T.; Mizojiri, K.; Yamada, H.; Yamamoto, R. (Faculty Pharmaceutical Sciences, Nagoya City Univ., Tanabe-dori, Mizuho-ku, Nagoya 467, Japan). *Chem. Pharm. Bull.* 25(9): 2147-2155; 1977.

5146 THE EFFECT OF VISCOUS SUBSTANCES ON THE TRANSIT TIME OF BARLEY DIGESTA IN RATS. (Eng.) Gohl, B.; Gohl, I. (Agricultural Coll. Sweden, S-750 07 Uppsala, Sweden). *J. Sci. Food Agric.* 28(10):911-915; 1977.

See also, 5077, 5179, 5328, 5395, 5412, 5468, 5469, 5478, 5590, 5800.

5147 EFFECT OF METOCLOPRAMIDE ON PROLACTIN SECRETION IN MAN. (Ita.) Minuto, F.; Marugo, M.; Giusti, M.; Baiardi, M. (Istituto Scientifico di Medicina Interna, dell'Universita di Genova, Genoa, Italy). *Boll. Soc. Ital. Biol. Sper.* 52(21):1802-1807; 1976.

5148 PREMATURE INCREASES IN AMYLASE OF POSTNATAL RAT PAROTID WITH CHRONIC ISOPROTERENOL. (Eng.) Schneyer, C. A. (Dept. Physiology, Univ. Alabama, Birmingham, AL 35294). *Proc. Soc. Exp. Biol. Med.* 155(3):440-444; 1977.

5149 CYCLIC NUCLEOTIDE ACTIVITY IN GASTROINTESTINAL TISSUES AND FLUIDS. (Eng.) Schwartzel, E. H. Jr.; Bachman, S.; Levine, R. A. (Upstate Medical Center, 750 E. Adams St., Syracuse, NY 13210). *Anal. Biochem.* 78(2):395-405; 1977.

5150 ENZYME ADAPTATION TO PROTEIN DEFICIENCY AND CHANGES IN FOOD LIPIDS COMPONENTS. (Eng.) Pokrovsky, A. (Inst. Nutrition, Medical Acad. Science, Ustinskij pier 2/14, Moscow, USSR). *Bibl. Nutr. Dieta* (23):34-50; 1976.

5151 DEPENDENCE OF THE CIRCADIAN RHYTHM OF BODY AND LIVER PROTEIN, LIPID AND GLYCOGEN ON THE HOURS OF PROTEIN INTAKE. (Eng.) Markova, M.; Angelova, K. (Hygiene Center, 15 Dimitar Nestorov Str., Sofia, Bulgaria). *Bibl. Nutr. Dieta* (23):163-168; 1976.

See also, 5068, 5078, 5236.

SECRETION AND METABOLISM

Stomach

5152 EFFECT OF ATROPINE ON MEAL-STIMULATED GASTRIN AND GASTRIC INHIBITORY POLYPEPTIDE (GIP) RELEASE. (Eng.) Baumert, J. E., Jr.; Cataland, S.; Tetirick, C. E., Jr.; Pace, W. G.; Mazzaferri, E. L. (Ohio State Univ. Hosp., 410 W. 10th Ave., Columbus, OH 43210). *J. Clin. Endocrinol. Metab.* 46(3):473-476; 1978.

The effect of atropine (80 μg/kg, s.c.) on meal-stimulated gastric inhibitory polypeptide (GIP) and gastrin release was studied in five foxhounds and compared with control studies done in the same animals given a meal without atropine. Without atropine, peak incremental serum gastrin occurred between 5 and 15 min after the meal, whereas the greatest increment in serum GIP occurred 60 min postcibal. Atropine had no effect on basal concentrations of gastrin or GIP. However, when atropine was given before feeding, serum gastrin concentrations from 75 to 120 min postcibal were significantly higher ($p<0.04$) than after the meal alone. The normal meal-stimulated rise in serum GIP was almost completely inhibited by atropine. It is concluded that (a) the rise in serum gastrin after a meal preceeds the rise in serum GIP; (b) atropine potentiates the late gastrin response while suppressing the increase in serum GIP after a meal; and (c) the mechanism by which atropine potentiates gastrin release may be related to its suppressive effects on intestinal inhibitors of gastrin secretion, such as GIP.

5153 SERUM GASTRIN CONCENTRATIONS FOLLOWING ORAL BETHANECHOL WITH AND WITHOUT A MEAL. (Eng.) Humphries, T. J.; Higgs, R. H.; Castell, D. O.; McGuigan, J. E. (Naval Regional Medical Center, Philadelphia, PA 19145). *Am. J. Dig. Dis.* 23(3):225-228; 1978.

The effect of p.o. bethanechol (B) on endogenous gastrin release, both basally and in association with the physiologic stimulus of a protein meal, was studied in 10 men without gastrointestinal disease. Serum gastrin levels were obtained from these subjects following (1) a p.o. placebo, (2) a p.o. dose of 25 mg of B, (3) a 100-g protein meal plus placebo, and (4) a 100-g protein meal plus 25 mg of B. Following B or placebo, there were no significant changes in basal serum gastrin levels of 98.7 ± 29.3 pg/ml and 82.4 ± 12.3 pg/ml, resp. Significant increases ($p<0.05$) of serum gastrin occurred after the protein meal and after the protein meal combined with B. The gastrin levels thus obtained were significantly greater than basal values but not different from each other. It is proposed that lower esophageal sphincter pressure increases after B administration are not due to the release of endogenous gastrin, as shown by the absence of increases in basal serum gastrin levels and failure to augment the gastrin release of a physiologic stimulus.

5154 EFFECT OF CATECHOLAMINES ON GASTRIN RELEASE.

(Eng.) Hayes, J. R.; Ardill, J.; Shanks, R. G.; Buchanan, K. D. (Dept. Medicine, Queen's Univ., Belfast, Northern Ireland). *Metabolism* 27(4):385-391; 1978.

In vivo and *in vitro* techniques were used to study the effect of catecholamines on gastrin release. The i.v. infusion of epinephrine (1 μg/kg/min for 2 20-min periods) in dogs produced a significant rise in the plasma gastrin concentration (from 48 ± 9 pg/ml to 97 ± 38 pg/ml, $p<0.001$, for the first infusion; from 48 ± 15 pg/ml to 90 ± 35 pg/ml, $p<0.01$ for the second infusion). This response was prevented by the administration of propranolol (0.1 mg/kg, i.v. 25 min before epinephrine; 1.4 μg/kg/min during epinephrine infusion). The infusion of isoproterenol (0.02 μg/kg/min, 15 min) produced a significant rise in gastrin level, while phenylephrine (0.6, 2.5, or 10 μg/kg/min) had no effect. In *in vitro* studies using isolated pieces of rat antrum, isoproterenol stimulated acute phase release of gastrin, whereas phenylephrine was again without effect. The studies indicate that catecholamines directly influence gastrin cell function.

5155 A SPECIFIC GASTRIN RECEPTOR SITE IN THE RAT STOMACH.

(Eng.) Brown, J.; Gallagher, N. D. (Royal Prince Alfred Hosp., Sydney, New South Wales 2050, Australia). *Biochim. Biophys. Acta* 538(1):42-49; 1978.

A specific receptor for gastrin I was demonstrated in the rat stomach fundus. In addition, the action of other hormones on gastrin receptor binding was studied. Specific binding of ^{125}I-labeled gastrin I was localized to particles sedimenting between 250-20,000 x *g*. Saturation of binding sites occurred with a gastrin concentration of 10^{-11} M in an assay system containing 0.6-1.7 mg/ml of homogenate protein. Gastrin binding was reversible, temperature- and pH-dependent, and susceptible to tryptic digestion. Electron microscopic and enzymatic studies showed the binding fraction to contain predominantly mitochondria. Preincubation of the homogenate with 10^{-8} M cholecystokinin or secretin inhibited gastrin binding to a greater extent (60%) than did an equimolar concentration of pentagastrin (0%); 10^{-7} M pentagastrin, however, inhibited gastrin binding 86%. Cimetidine (10^{-8} M) did not affect the binding of gastrin to the receptor, suggesting that the gastrin and histamine receptors do not share the same locus.

5156 QUANTITATION OF ANTRAL GASTRIN CELL POPULATIONS IN THE DOG.

(Eng.) Delaney, J. P.; Michel, H. M.; Michael, M.; Eisenberg, M.; Bonsack, M. (Univ. Hosp., Box 89, 420 Delaware St., S.E., Minneapolis, MN 55455). *Gastroenterology* 74(4):708-712; 1978.

With a view to developing a technique for quantitating gastrin (G) cells that would allow sequential sampling of the antral mucosa before and after experimental manipulations, a method for identifying G cells was first validated; the distribution and variability of G cell numbers within single dog antrums and differences among animals were then studied. A method for enumerating G cells in dog antral mucosa by a fluorescent antibody technique was shown to be valid with respect to specificity and reproducibility. The state of intracellular gastrin storage did not influence G cell identification by this technique. To obtain values representative of the entire antrum, it was found that all G cells in long strips of antral mucosa had to be counted. Results were best expressed as G cells/cm length of mucosa. Even with large mucosal samples, there were considerable variations in G cell density within a single antrum. The "average" dog antrum contained about 35 million G cells. There was as much as a twofold range in G cell density from one dog to another. Each animal should, therefore, serve as its own control when influences on G cell populations are to be studied experimentally.

5157 IN VIVO RELEASE OF GASTRIN INTO HUMAN GASTRIC JUICE.

(Eng.) Knight, N. F.; Fiddian-Green, R. G.; Vinik, A. I. (Groote Schuur Hosp., Cape Town, South Africa). *Br. J. Surg.* 65 (2):118-120; 1978.

The release of antral gastrin was examined in seven healthy human subjects by infusing saline and albumin into their stomachs. Immunoreactive gastrin (IRG) was present in fasting serum but not in fasting gastric juice. Intragastric infusions of saline and albumin induced small but significant ($p<0.05$) rises in the serum concentrations of IRG. There was no significant difference between the magnitude of the serum gastrin responses to these two stimuli. The stimuli induced an increase in the luminal concentration of IRG that was sixfold greater than that in the serum concentration of IRG. The response to albumin was significantly greater than the response to saline ($p<0.05$). The IRG in gastric juice was chromatographically similar to heptadecapeptide (G17) gastrin. The stimuli also released IRG in five patients with duodenal ulcers. The magnitude of the release into serum and gastric juice in these patients was significantly reduced by antrectomy ($p<0.05$). This result, together with those obtained with molecular sieve and anion exchange chromatography, suggest that the IRG in gastric juice may be G17.

5158 INTERRELATIONSHIPS BETWEEN THE GASTRIC SECRETORY RESPONSES, PROSTAGLANDIN E_2 INHIBITION AND SERUM LEVEL OF IMMUNOREACTIVE GASTRIN IN PYLORUS-LIGATED AND ANTRECTOMIZED RATS.

(Eng.) Nagy, L.; Mozsik, G.; Tarnok, F.; Szalai, M.; Poth, I.; Javor, T. (Univ. Medical Sch., H-7643 Pecs, Hungary). *Pharmacology* 16(3):135-141; 1978.

The effects of prostaglandin E_2 (PGE_2) on gastric secretion and the serum level of immunoreactive gastrin were studied in pylorus-ligated and antrectomized rats. The administration of PGE_2 (75, 150, or 300 μg/kg, s.c.) caused a significant decrease in both volume of gastric secretion and acid output in both pylorus-occluded ($p<0.01$) and antrectomized rats ($p<0.001$). No significant changes were found in the serum gastrin levels of both pylorus-ligated and antrectomized rats. No significant changes in serum levels of immunoreactive gastrin were produced by different doses of PGE_2, in comparison with their marked inhibitory effects on gastric H^+ secretion. It is concluded that immunoreactive gastrin plays no essential role in the development of gastric hypersecretion or in PGE_2-produced inhibition on gastric secretion in pylorus-occluded rats.

5159 EFFECT OF METHYLATED PROSTAGLANDIN E_2 ANALOGUE ON CANINE AND HUMAN GASTRIC MUCOSAL BARRIER. (Eng.) Konturek, S. J.; Tasler, J.; Obtulowicz, W.; Kwiecien, N.; Sito, E.; Oleksy, J. (Inst. Physiology, 31-531 Krakow, Grzegorzecka 16, Poland). *Gastroenterol. Clin. Biol.* 2(2):177-184; 1978.

The effects of synthetic 15 (S)-15-methyl-prostaglandin E_2 methyl ester (PG-S) on the ionic permeability of the gastric mucosa under resting conditions and following bile salt-induced disruption of the mucosal barrier were studied in Heidenhain pouch dogs and in six healthy men. The PG-S instilled into the pouch in a high concentration (40 μg/kg/hr) or given i.v. in a large dose (5 μg/kg/hr) did not alter the mucosal barrier, sodium taurocholate. PG-S introduced into the healthy human stomach in a therapeutic dose (1.5 μg/kg) caused a marked increase in Na^+ output ($p<0.05$) without significant change in H^+ back-diffusion and did not change the response of the mucosa to sodium taurocholate. These studies indicate that PG-S given locally or i.v. does not affect the gastric mucosal barrier in the dog and probably also does not affect the mucosal barrier in the human stomach, although the increased output of Na^+ is difficult to explain.

5160 VAGAL STIMULATION AND ITS ROLE IN ELICITING GASTRIN BUT NOT GLUCAGON RELEASE FROM THE ISOLATED PERFUSED DOG STOMACH. (Eng.) Lefebvre, P. J.; Luyckx, A. S.; Brassinne, A. H. (Hopital de Baviere, Blv. de la Constitution, 66 B-4020 Liege, Belgium). *Gut* 19(3):185-188; 1978.

The effect of an electrical stimulation of the vagus nerves on glucagon release from the isolated perfused dog stomach was investigated. Electrical stimulation (10 V, 10 Hz, 3 min) of both dorsal and ventral vagal trunks of the stomach perfused with whole blood induced strong gastric contractions, transient release of cyclic guanosine monophosphate, and marked gastrin release ($p<0.02$ at 30-60 sec, $p<0.01$ at 90-240 sec). No gastric glucagon release was elicited either at "normal" (4.8 ± 0.1 mM) or at low (1.5 ± 0.1 mM) concentrations of blood glucose. It is concluded that, in conditions effective for the stimulation of gastrin release, electrical stimulation of the vagus nerves does not stimulate glucagon release from the isolated perfused dog stomach. Thus, one of the well accepted mechanisms controlling pancreatic-glucagon secretion, vagal stimulation, is ineffective on gastric glucagon release.

5161 THE ISOLATION AND PROPERTIES OF A NON-PEPSIN PROTEINASE FROM HUMAN GASTRIC MUCOSA. (Eng.) Roberts, N. B.; Taylor, W. H. (Liverpool Area Health Authority [Teaching], Central Southern District, Ashton St., Liverpool L3 5RT, England). *Biochem. J.* 169(3):617-624; 1978.

A nonpepsin proteinase, proteinase 2, was successfully isolated free from pepsinogen from the gastric mucosa of a patient with a duodenal ulcer and the uninvaded mucosa of a patient with a gastric adenocarcinoma by repetitive chromatography on diethylaminoethane- and carboxymethyl-celluloses, and its properties were compared with those of other human gastric proteinases. Proteinases 1a and 1b, found in gastric adenocarcinoma, were not found in the gastric mucosa of these patients. Proteinase 2 was shown to have an asymmetrical broad pH-activity curve with a maximum over the pH range 3.0-3.7. Proteolytic activity of proteinase 2 was inhibited by pepstatin; the concentration of pepstatin giving 50% inhibition was 3 nM. Inhibition of proteolytic activity by carbenoxolone and related triterpenoids indicated that, at pH 4.0, proteinase 2 possesses structural characteristics relating it to the pepsins and, at pH 7.4, to the pepsinogens. The sites of cleavage of the B-chain of oxidized insulin for proteinase 2 at pH 1.7 and pH 3.5 were shown to be similar to those previously established for human pepsin 3 and for the cathepsin E of rabbit bone marrow. The nonpepsin proteinase 2 (cathepsin) of human gastric mucosa has properties more similar to cathepsin E than to cathepsin D.

5162 ACTIVATION OF HUMAN ADENYLATE CYCLASE IN THE UPPER GASTROINTESTINAL TRACT BY VASOACTIVE INTESTINAL POLYPEPTIDE. (Eng.) Simon, B.; Kather, H. (Medizinische Universitatsklinik Heidelberg, 6900 Heidelberg, W. Germany). *Gastroenterology* 74(4):722-725; 1978.

To explore the mechanism involved, the effects of various polypeptide hormones, known to inhibit gastric acid secretion, on the adenylate cyclase system were tested in human gastric and duodenal mucosal homogenates. Glucagon (1 mg/ml) and secretin (20 μg/ml) failed to stimulate the enzyme system in the stomach. The latter hormone produced a small but significant activation of the duodenal cyclase ($p \leq 0.05$). The vasoactive intestinal polypeptide (VIP), however, induced a dose-dependent increase of enzyme activity throughout the stomach and the duodenum. Maximal effects (1.8- to 3.0-fold increase) were observed at a VIP-concentration of about 10 μg/ml. Because the entire physiological role of VIP in gastric function has not been defined, it cannot be discerned whether the VIP-stimulated adenylate cyclase is linked to inhibition of gastric acid secretion or to another effect of this hormone in human gastric function.

5163 EFFECT OF DOPAMINE IN STRESS ULCER OF RATS. (Eng.) Lauterbach, H. H.; Mattes, P. (Dept. General Surgery, Univ. Ulm, Steinhovelstrasse 9, D-7900 Ulm, W. Germany). *Eur. Surg. Res.* 9(4):258-263; 1977.

5164 GASTRIC ADENOSINE TRIPHOSPHATASES: A REVIEW OF THEIR POSSIBLE ROLE IN HCl SECRETION. (Eng.) Forte, J. G.; Lee, H. C. (Dept. Physiology-Anatomy, Univ. California, Berkeley, CA 94720). *Gastroenterology* 73(4, Part 2):921-926; 1977.

5165 METABOLIC CHANGES ASSOCIATED WITH GASTRIC STIMULATION. (Eng.) Hersey, S. J. (Dept. Physiology, Emory Univ., Atlanta, GA 30322). *Gastroenterology* 73(4, Part 2):914-919; 1977.

5166 WEAK ACID ACCUMULATION IN THE SEROSAL EXTRACELLULAR COMPARTMENT OF THE FROG GASTRIC MUCOSA. (Eng.) Villegas, L. (Centro de Biofisica y Bioquimica, Instituto de Investigaciones Cientificas [IVIC], Apartado 1827, Caracas 101, Venezuela). *Biochim. Biophys. Acta* 469(3): 237-245; 1977.

5167 INTERRELATIONSHIPS BETWEEN HISTAMINE, PROSTAGLANDINS, AND CYCLIC AMP IN GASTRIC SECRETION: A HYPOTHESIS. (Eng.) Dousa, T. P.; Dozois, R. R. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 73(4, Part 2):904-912; 1977.

5168 THE EFFECTS OF ZINC SULPHATE ON GASTRIC HISTAMINE RELEASE AND ULCER FORMATION IN STRESSED PYLORUS-OCCLUDED RATS. (Eng.) Ogle, C. W.; Cho, C. H. (Faculty Medicine, Univ. Hong Kong, Hong Kong). *Pharmacol. Res. Commun.* 9(8): 679-688; 1977.

5169 INHIBITORY EFFECT OF FENTONIUM ON GASTRIC ACID SECRETION IN DIFFERENT LABORATORY ANIMALS. (Eng.) Impicciatore, M.; Morini, G.; Cavaggioni, A. L.; Bertaccini, G. (Inst. Pharmacology, Univ. Parma, Parma, Italy). *Farmaco [Sci.]* 32(7):482-489; 1977.

5170 GASTRIN RELEASE IN RESPONSE TO ARGININE INFUSION. (Eng.) Dent, J.; Adeney, P.; Hansky, J. (Medical Coll. Wisconsin, 8700 W. Wisconsin Ave., Milwaukee, WI 53226). *Digestion* 16(1/2):23-27; 1977.

5171 THE EFFECT OF HEXAMETHONIUM ON GASTRIC ACID SECRETION IN THE CONSCIOUS RAT. (Eng.) Bunce, K. T.; Parsons, M. E. (Smith Kline & French Lab., Ltd., Welwyn Garden City, Hertfordshire, England). *Agents Actions* 7(5/6):507-511; 1977.

5172 THE COMPARATIVE GASTRIC ULCEROGENIC ACTIVITES ON NON-STEROID ANTI-INFLAMMATORY DRUGS. (Eng.) Rainsford, K. D. (Univ. Tasmania Medical Sch., G.P.O. Box 252C, Hobart, Tasmania 7001, Australia). *Agents Actions* 7(5/6):573-577; 1977.

5173 INFLUENCE OF ASPIRIN ON HEALING OF CHRONIC GASTRIC ULCERS IN DOGS. (Eng.) Takeuchi, K.; Okabe, S.; Takagi, K.; Umeda, N. (Faculty Pharmaceutical Science, Univ. Tokyo, 7-3-1 Hongo, Bunkyo, Tokyo 113, Japan). *Digestion* 16(1/2):51-56; 1977.

5174 COMPARISON OF THE STEP-DOSE AND SINGLE-DOSE ACID RESPONSE TO HISTAMINE AND PENTAGASTRIN IN CHRONIC GASTRIC FISTULA RATS. (Eng.) Pascaud, X. B.; Roger, A. R.; Genton, M. J. H. (INRS, 14 rue du Val d'Or, F-92150 Suresnes, France). *Digestion* 16(1/2):57-68; 1977.

5175 A STUDY OF ACIDIC GLYCOSAMINOGLYCANS IN HUMAN GASTRIC TISSUE. (Eng.) Sekino, T.; Murata, K.; Saito, Y.; Tsubura, K. (Univ. Tokyo Sch. Medicine, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113, Japan). *Digestion* 16(1/2):28-39; 1977.

5176 GASTRIC SECRETION WITH FEEDING AND RESTRAINT IN CONSCIOUS RHESUS MONKEYS. (Eng.) Bauer, R. F.; Ambromovage, A. M. (Sch. Medicine, Univ. Pennsylvania, Philadelphia, PA 19104). *J. Med. Primatol.* 6(4):245-250; 1977.

5177 BLOOD GROUP ABH AND PRECURSOR ACTIVITIES OF HUMAN GASTRIC MUCUS AND MUCOSAL EXTRACTS [Abstract]. (Eng.) Feizi. T.; Picard, J. (MRC Clinical Res. Center, Harrow, Middlesex, England). *Adv. Exp. Med. Biol.* 89:510, 1977.

5178 CHANGES OF MUCOSUBSTANCES IN THE GASTRIC JUICES DURING AND FOLLOWING RESTRAINT-COLD STRESS IN RATS [Abstract]. (Eng.) Hayashi, T.; Ito, H.; Glass, G. B. J. (Tokyo Medical Coll. Hosp., Tokyo, Japan). *Adv. Exp. Med. Biol.* 89:510-511; 1977.

5179 SIMULTANEOUS MEASUREMENT OF GASTRIC SECRETION AND MOTILITY IN RESPONSE TO VARIOUS STIMULI IN THE FERRET [Abstract]. (Eng.) Andrews, P. L. R.; Bower, A. J. (Dept. Physiology, Univ. Sheffield, Sheffield 10, England). *J. Physiol. (Lond.)* 275:53P; 1978.

5180 ACID SECRETION WITHOUT CHANGES IN MUCOSAL CYCLIC NUCLEOTIDES IN THE GUINEA-PIG STOMACH [Abstract]. (Eng.) Canfield, S. P.; Curwain, B. P.; Phillips, J.; Price, C. (St. Mary's Hosp. Medical Sch., London W2 1PG, England). *J. Physiol. (Lond.)* 275:52P-53P; 1978.

5181 INHIBITION OF GASTRIC HCO_3^- SECRETION BY NORADRENALINE AND ADRENALINE [Abstract]. (Eng.) Flemstrom, G. (Dept. Physiology and Medical Biophysics, Univ. Uppsala, Uppsala, Sweden). *Acta Physiol. Scand.* 102(1):17A-19A; 1978.

5182 PIRENZEPINE--A NEW ANTISECRETORY DRUG [Abstract]. (Eng.) Stockbrugger, R.; Jaup, B.; Dotevall, G. (Sahlgrenska Sjukhuset, Goteborg, Sweden). *Scand. J. Gastroenterol.* 12 (Suppl. 45):103; 1977.

5183 A NON-CHOLINERGIC COMPONENT OF THE DISTENSION POTENTIATION OF GASTRIC ACID SECRETION [Abstract]. (Eng.) Davison, J. S.; Schofield, B. (Dept. Physiology, Univ. Dundee, Dundee DD1 4HN, Scotland). *J. Physiol. (Lond.)* 273(2):59P-60P; 1977.

See also, 5068, 5069, 5070, 5071, 5076, 5081, 5125, 5308, 5401, 5412, 5417, 5420, 5423, 5426, 5440, 5443, 5449, 5461, 5462, 5475, 5476, 5487, 5493, 5496, 5816.

SECRETION AND METABOLISM

Pancreas

5184 EXOCRINE PANCREAS UNDER EXPERIMENTAL CONDITIONS. IV. ALTERATIONS OF INTERCELLULAR JUNCTIONS BETWEEN ACINAR CELLS FOLLOWING PANCREATIC DUCT LIGATION. (Eng.) Metz, J.; Merlo, M.; Billich, H.; Forssmann, W. G. (Anatomisches Institut der Universitat, Im Neuenheimer Feld 307, D-6900 Heidelberg, W. Germany). *Cell Tissue Res.* 186(2):227-240; 1978.

To study early ultrastructural alterations of the permeability barrier between the luminal and interstitial compartments of the exocrine pancreas, pancreatic tissue from male Wistar rats was investigated during various intervals after pancreatic duct ligation. Concomitant to the increase of the intraluminal pressure, alterations were found in the arrangement of the luminal membrane surface and the zonulae occludentes of the acinar cells. The strands of the zonulae occludentes exhibited a disarrangement. The number of strands diminished and small interruptions as well as large discontinuities of the strands were observed in most regions of the acinar cells. Furthermore, gap junctions were found very infrequently between acinar cells. The ultrastructural alterations of the zonulae occludentes suggest a gradual adaptation to the increasing unilateral pressure. However, a leakage of the paracellular permeability barrier occurred, which contributed to the known shunt between the compartments of the pancreatic juice and the interstitial space following pancreatic duct obstruction.

5185 PANCREATIC ACINAR CELLS: ACETYLCHOLINE-EVOKED ELECTRICAL UNCOUPLING AND ITS IONIC DEPENDENCY. (Eng.) Iwatsuki, N.; Petersen, O. H. (Dept. Physiology, Univ. Dundee, Dundee DD1 4HN, Scotland). *J. Physiol. (Lond.)* 274:81-96; 1978.

Acetylcholine (ACh)-evoked electrical uncoupling and its ionic dependency were investigated in pancreatic acinar cells from mice and rats, and the source of the calcium needed in the uncoupling process was studied. Isolated segments of mouse or rat pancreas were placed in a Perspex bath through which physiological saline solutions were circulated. Intracellular recordings from surface acini were made by inserting up to three separate microelectrodes into neighboring cells within the same acinus. Through one of these electrodes current pulses were injected. Electrical coupling between the cells was continuously assessed. The acinus under investigation was stimulated by iontophoresis of ACh from an extracellular micropipette. During resting conditions, all cells within an acinus were fully electrically coupled. A 5- to 10-sec pulse of a relatively large iontophoretic ACh-ejecting current, causing initially the well characterized surface cell membrane depolarization and resistance reduction, was followed by a marked electrical uncoupling of neighboring cells. In some cases, one cell was clearly being isolated equally from the two other cells impaled; in other cases, the cell into which current pulses were injected was becoming more isolated from one of the neighboring cells than from the other one. The ACh-evoked electrical uncoupling was completely reversible and could be repeatedly observed in the same cell. The electrical uncoupling in response to short pulses of ACh (5-10 sec) was not affected by even prolonged (≤ 50 min) exposure to Ca-free solution containing ethylene glycol-bis-(β-aminoethylether)-N,N^1-tetraacetic acid. ACh-evoked uncoupling (short pulses) was not reduced about 5 min after introduction of 2 mM Mn or of 5 mM Ni or Co. Mn thereafter gradually reduced and finally (after about 30 min) abolished the ACh-evoked uncoupling. Ni and Co gradually enhanced the uncoupling response. The blocking effect of Mn on the ACh-evoked uncoupling occurred much faster in the absence of superfusion fluid Ca. During a period of sustained ACh stimulation, sustained electrical uncoupling was observed. If 5 mM Ni or Co was introduced during such a stimulatory period, the cells recoupled. This effect of Ni and Co was immediate and fully reversible. The uncoupling responses to short pulses of ACh was not reduced immediately after replacing superfusion fluid Na by Tris at a time when the surface cell membrane depolarization and resistance reduction was already severely reduced. Thereafter, a gradual slow reduction of the ACh-evoked uncoupling was observed. This uncoupling did not occur if Na was replaced by Li. It is concluded that the Ca needed to raise $[Ca^{2+}]_i$ sufficiently to cause electrical uncoupling comes from the cells in cases of uncoupling evoked by short pulses of ACh, but from the external solution in cases of sustained uncoupling evoked by sustained stimulation of ACh.

5186 β-ADRENOCEPTOR STIMULATION OF EXOCRINE SECRETION FROM THE RAT PANCREAS. (Eng.)

Furuta, Y.; Hashimoto, K.; Washizaki, M. (Res. Lab., Nippon Kayaku Co., Shimo, Kita-ku, Tokyo 115, Japan). *Br. J. Pharmacol.* 62(1):25-29; 1978.

The effects of i.v. catecholamines on exocrine pancreas secretion were investigated in anesthetized rats. The flow rate of pancreatic juice under resting conditions was 11.1 ± 3.2 μl/hr in 100 animals. Dopamine (0.3-3 mg/kg) and isoproterenol (1-10 μg/kg) induced almost the same increase in pancreatic secretion, showing that dopamine is 300 times less potent than isoproterenol. The relative potency of the two amines for stimulation of pancreatic secretion was equivalent to that for β-stimulation of the contractile force of the left ventricle *in vivo*. Propranolol (0.5 mg/kg) completely antagonized the dopamine- and isoproterenol-induced stimulation of pancreatic secretion. Haloperidol (10 mg/kg) failed to suppress the secretory effect of dopamine on the exocrine pancreas but abolished the dopamine-induced hypotension. The dopamine-induced secretion was not modified by atropine (3 mg/kg), phenoxybenzamine (3 mg/kg), vagotomy, or pithing. Epinephrine and norepinephrine (10 μg/kg) induced secretion after phenoxybenzamine treatment (3 mg/kg). It is suggested that the rat pancreas has a stimulatory β-adrenoceptor mechanism of exocrine secretion.

5187 EXOCRINE PANCREATIC SECRETION AND IMMUNOREACTIVE SECRETIN (IRS) RELEASE AFTER INTRADUODENAL INSTILLATION OF BILE IN MAN. (Eng.)

Osnes, M.; Hanssen, L. E.; Flaten, O.; Myren, J. (Ulleval Hosp., Oslo 1, Norway). *Gut* 19(3):180-184; 1978.

Because the effect of bile on endogenously stimulated pancreatic enzyme secretion and on exogenously stimulated bicarbonate secretion is uncertain, the effect of intraduodenal instillation of bile on basal pancreatic secretion was studied in six subjects with a normal endoscopic pancreatogram. In addition, the effect of bile on immunoreactive secretin (IRS) release was studied. The subjects were investigated after an overnight fast by means of a side-viewing duodenoscope. After cannulation of the main pancreatic duct, juice was collected in 5-min samples for 20 min. An iso-osmolar solution of 6 g cattle bile was then infused into the duodenum through a separate catheter attached to the outside of the duodenoscope, and pancreatic juice collected in 5-min samples for another 20 min. Blood was frequently drawn from an arm vein through an indwelling catheter for estimation of IRS by radioimmunoassay. The flow rate of pancreatic juice and outputs of bicarbonate, amylase, and protein increased significantly after bile infusion ($p<0.02$ for pancreatic juice, $p<0.05$ or $p<0.02$ for bicarbonate, $p<0.02$ for amylase, and $p<0.02$ or $p<0.05$ for protein). A significant rise in plasma IRS was also found 5 min after instillation of bile ($p<0.02$). This study confirms the previous hypothesis that secretin is released from the upper intestine. The release of secretin is probably not the sole explanation of the observed increase in pancreatic enzyme secretion.

5188 THE EFFECT OF THE IONOPHORE A23187 ON AMYLASE RELEASE, CELLULAR INTEGRITY AND ULTRASTRUCTURE OF MOUSE PANCREATIC ACINI. (Eng.)

Williams, J. A. (Dept. Physiology, Univ. California, San Francisco, CA 94143). *Cell Tissue Res.* 186(2): 287-295; 1978.

The effects of the Ca^{2+} ionophore A2317 on pancreatic amylase and LDH release, cellular electrolyte balance, and cell ultrastructure were studied in incubated pancreatic fragments from Swiss mice. A23187 (0.3 μM) in the presence of Ca^{2+} increased amylase release, but at higher concentrations (1-10 μM) it also increased LDH release and increased the uptake of ^{14}C-sucrose with concomitant loss of tissue K^+ and gain in Na^+. The ultrastructure of the majority of acini appeared normal but showed depletion of zymogen granules. Microtubules and microfilaments, which have been implicated in the release process, were normal or increased in number. In the absence of Ca^{2+}, the ionophore had no effect on secretion, cellular integrity, or ultrastructure. It is concluded that A23187 in the presence of Ca^{2+} increases amylase release by a mechanism comparable to the terminal steps in stimulus-secretion coupling induced by physiological secretagogues. This finding provides further evidence that amylase release is mediated by an increase in cell Ca^{2+}, although the mechanisms of the ionophore- and physiological secretagogue-induced rise in Ca^+ are probably different. High concentrations of ionophore (>1 μM) also induce Ca^{2+}-dependent damage in a fraction of the cells.

5189 COMPARATIVE ASSESSMENT OF THE SECRETIN-CERULEIN AND SECRETIN-PANCREOZYMIN TESTS IN THE STUDY OF THE EXOCRINE FUNCTION OF THE PANCREAS. (Rus.)

Grebenev, A. L.; Irmatov, M. N.; Pletneva, N. G.; Vainshtein, T. Ia.; Starodvortseva, V. G. (Dept. Introduction into Internal Diseases,

I. M. Sechenov 1st Moscow Medical Inst., Moscow, USSR). *Lab. Delo* (7):400-403; 1977.

5190 GASTRIC SECRETAGOGUE PANCREATIC PEPTIDE (GSP): A NEW HORMONE OF THE GASTROINTESTINAL TRACT? (Ger.) Pointner, H. (I. Medizinischen Universitatsklinik, Lazarettgasse 14, A-1097 Vienna, Austria). *Fortschr. Med.* 95(17):1153-1154; 1977.

5191 PANCREOZYMIN RECEPTORS OF ACINUS CELLS. (Fre.) Robberecht, P.; Deschodt, M.; Christophe, J. (No affiliation given). *Rev. Fr. Gastroenterol.* (132):66-67; 1977.

5192 BIOENERGY PROCESSES IN THE LIVER IN ACUTE EXPERIMENTAL PANCREATITIS. (Rus.) Kriuchok, A. G.; Chumakov, V. N.; Smelianskaia, G. N. (Dept. Operative Surgery, Minsk Medical Inst., Minsk, USSR). *Patol. Fiziol. Eksp. Ter.* (4):37-40; 1976.

5193 PROFILES OF PURE PANCREATIC SECRETIONS IN NORMAL HUMAN SUBJECTS [Abstract]. (Eng.) Rinderknecht, H.; Renner, I. G.; Douglas, A. P.; Adham, N. F. (Veterans Admin. Hosp., Sepulveda, CA). *Clin. Res.* 26(2):151A; 1977.

5194 L-LEUCINE METABOLISM IN THE EXOCRINE PANCREAS OF THE RAT [Abstract]. (Eng.) Vincent, D.; Bauduin, H. (Lab. Biochemical Pharmacology, Free Univ. Brussels, Brussels, Belgium). *Digestion* 16(1/2):219-220; 1977.

5195 SPECIFIC HORMONAL REGULATION OF HUMAN PANCREATIC SECRETION [Abstract]. (Eng.) Kalbermatten, N. de; Bambule-Dick, J.; Felber, J. P. (Departement de Medecine, C.H.U.V., 1011 Lausanne, Switzerland). *Digestion* 16(1/2):211; 1977.

5196 COMBINED EFFECT OF CYTOCHALASIN B, VINBLASTINE AND DEUTERIUM OXIDE ON CAERULEIN-INDUCED ENZYME RELEASE IN THE EXOCRINE PANCREAS OF THE RAT [Abstract]. (Eng.) Stock, C.; Launay, J. F.; Bauduin, H. (INSERM U 61, Strasbourg, France). *Digestion* 16(1/2):218-219; 1977.

5197 POST-PRANDIAL TRYPSINOGEN SECRETION AND ITS GASTRIC INHIBITORY EFFECT IN DOG [Abstract]. (Eng.) Mendes de Oliveira, J. P.; Demol, P.; Singer, M.; Tiscornia, O. M.; Sarles, H. (INSERM U 31, 46 chemin de la Gaye, 13009 Marseille, France). *Digestion* 16(1/2):215-216; 1977.

5198 EFFECT OF CHRONIC IRRITATION OF SPLANCHNIC NERVES ON PANCREATIC SECRETION IN THE DOG [Abstract]. (Eng.) Castello, H. B.; Sarles, J. C. (Hopital Nord, Marseille, France). *Ir. J. Med. Sci.* 146(Suppl. 1):22-23; 1977.

5199 ACTION OF A SYNTHETIC ANALOGUE OF PROSTAGLANDIN E_2 ON EXOCRINE AND ENDOCRINE PANCREAS IN THE RAT [Abstract]. (Eng.) Dodi, G.; Santoro, G.; Jaffe, B. M. (Dept. Surgery, Univ. Padova, Padova, Italy). *Ir. J. Med. Sci.* 146 (Suppl. 1):22; 1977.

See also, 5074, 5231, 5283, 5288, 5303, 5304, 5323, 5332, 5365, 5424, 5486, 5500, 5632, 5822.

SECRETION AND METABOLISM

Hepatobiliary Tract

5200 FREE RADICAL PEROXIDATION OF LIVER MITOCHONDRIAL AND MICROSOMAL PHOSPHOLIPIDS IN RAT POSTNATAL DEVELOPMENT. (Rus.) Lankin, V. Z.; Tikhaze, A. K.; Kotelevtseva, N. V.; Markelova, V. I. (All-Union Cardiological Res. Center, Moscow, USSR). *Biokhimiia* 42(7):1292-1297; 1977.

Characteristic features of enzymatic and nonenzymatic peroxidation of the phospholipids in liver mitochondria and microsomes during postnatal development were studied in Wistar rats. The mitochondria and microsomes were obtained from newborn and 1-, 2-, 4-, 8-, 10-, 12-, 14-, 18-, 24-, and 32-week-old rats. Activity of ascorbate-dependent (nonenzymatic) peroxidation showed a marked increase (both in the mitochondria and microsomes) up to the 4th week of the postnatal period, the maximal activity of NADPH-dependent peroxidation as observed in 8-week-old rats. These findings indicate that the maximal activity of both enzymatic and nonenzymatic peroxidation coincides with the maximal growth rate.

5201 MICROSOMAL OXIDATIVE DECOMPOSITION OF FOREIGN SUBSTANCES IN THE HUMAN LIVER.

OXIDATIVE DECOMPOSITION OF LIVER MICROSOMAL FRACTION FROM NEEDLE BIOPSY SPECIMEN, AS EXEMPLIFIED BY COUMARIN-7-HYDROXYLASE AND 7-ETHOXYCOUMARIN HYDROXYLASE IN HUMAN SUBJECTS WITH NORMAL LIVER AND IN PATIENTS WITH LIVER DISEASES. (Ger.) Kratz, F. (Zentrum fur Innere Medizin, Klinikum der Univ., Klinikstrasse 36, 6300 Giessen, W. Germany). *Fortschr. Med.* 96(8):393-397; 1978.

To investigate the oxidative metabolism of foreign substances in the liver, the coumarin-7-hydroxylase (C7H) and 7-ethoxycoumarin hydroxylase (7ECH) activities of liver microsomal fractions obtained from needle biopsy specimens were studied in normal subjects and in patients with various liver diseases. The C7H specific activity was 0.26-0.35 nmol/mg/min in 135 men and women with normal livers. The 7ECH specific activity in 88 control subjects with normal livers was 0.09-0.14 nmol/mg/min. The enzyme activities showed no sex- or age-related differences. The C7H specific activity was reduced significantly ($p<0.05$) during the early stage and peak of acute viral hepatitis (0.04 nmol/mg/min); in chronic aggressive hepatitis (0.10 nmol/mg/min); in alcoholic, hepatitis, and histologically active liver cirrhosis (0.11, 0.11, and 0.09 nmol/mg/min, resp.); in chronic alcoholic hepatitis (0.10 nmol/mg/min); and in other forms of chronic hepatitis with fatty liver (0.16 nmol/mg/min). However, there was no significant difference from the controls during the recovery stage from acute viral hepatitis, chronic persistent hepatitis, cryptogenic and histologically inactive liver cirrhoses, or alcoholic and diabetic fatty liver. The specific 7ECH activity was reduced significantly ($p<0.05$) during the early stage and peak of acute viral hepatitis (0.02 nmol/mg/min); chronic aggressive hepatitis (0.05 nmol/mg/min); alcoholic, hepatitic, and histologically inactive liver cirrhosis; and chronic hepatitis with fatty liver. The findings show that the oxidative metabolism of foreign substances in the liver may be altered significantly in liver diseases.

5202 COMBINED ACTION OF PYRAZOLE AND ETHANOL ON A RAT LIVER: HISTOCHEMICAL AND ULTRASTRUCTURAL STUDY. (Eng.) Skladzinski, J.; Beskid, M. (Center Postgraduate Medical Education, Marymoncka 99, Warsaw, Poland). *Folia Histochem. Cytochem.* 16 (1):13-18; 1978.

The effect of combined single-dose feeding of pyrazole (36 mg/kg daily) and ethanol (8.0 g/kg daily) was studied in the livers of male Wistar rats and compared to the effects of feeding the agents successively (pyrazole first) at a 30-min interval once or twice in 24 hr, feeding only one agent, or feeding neither (controls). After 30 days, the animals were sacrificed and the liver removed for histochemical and electron microscopic examination. No marked damage of the liver was noted when pyrazole alone was given. Feeding with ethanol alone induced slight morphological alterations in the liver. However, the combined administration of pyrazole and ethanol either together or successively had a highly toxic action leading to severe damage of the liver cells including small foci of necrosis (1 dose/24 hr) or massive necrosis (2 doses/24 hr). Histochemical examination revealed that pyrazole and ethanol administration led to fatty liver with an accompanying acid phosphatase reaction of varying intensity, the reaction being greatest in animals receiving two doses of drugs in 24 hr; succinic dehydrogenase activity also decreased most markedly in the latter animals. Ultrastructurally, electron microscopy revealed a marked increase of smooth endoplasmic reticulum and an accompanying decrease of rough endoplasmic reticulum, a swelling of the mitochondria and numerous liposomes, and lipid droplets in animals fed ethanol and pyrazole once in 24 hr. The picture of cytoplasmic damage was more severe in animals fed the agents twice in 24 hr. It is concluded that the metabolic block of ethanol oxidation induced by pyrazole causes an enhancement of the toxic effect of ethanol on the cell previously damaged by pyrazole. A similar situation may occur with other drugs, which unintentionally would produce a hepatotoxic effect.

5203 INFLUENCE OF DOPAMINE ON LIVER DYNAMICS IN HEMORRHAGIC SHOCK. (Eng.) Trachte, G. J.; Lefer, A. M. (Jefferson Medical Coll., 1020 Locust St., Philadelphia, PA 19107). *Circ. Shock* 4(4):305-315; 1977.

The effect of dopamine on arterial blood pressure, liver blood flow, cathepsin D activity, and free amino nitrogen concentration was investigated in male cats in hemorrhagic shock. Dopamine infusion (4 μg/kg/min) increased both mean arterial blood pressure ($p<0.025$) and liver blood flow ($p<0.05$) in postoligemic shock, but failed to prevent the marked increases in circulating cathepsin D and free amino nitrogen. Dopamine infusion resulted in an increased plasma cathepsin D activity in shock in comparison with that in sham-shocked animals ($p<0.001$). This increased accumulation of a lysosomal marker enzyme probably results from increased washout of the enzyme from the splanchnic or hepatic vascular bed in response to increased blood flow in these areas rather than from a direct effect of dopamine on lysosomal integrity. The increase in hepatic artery and portal vein flows appeared to result from stimulation of dopaminergic receptors, since the dopamine dose was in the dopaminergic range and because haloperidol (5 μg/ml), a dopamine blocker, abolished the improved hemodynamic effects of dopamine. This study suggests that dopamine benefits the animal in hemorrhagic shock hemodynamically, but does not reverse the metabolic and cellular problems in shock. Perhaps, in combination with a drug opposing the biochemical basis of shock, dopamine may provide a greater anti-shock action.

5204 ADAPTIVE CHANGES OF THE RAT LIVER CELLS INDUCED BY REPEATED INTRAPERITONEAL INJECTIONS OF D-GALACTOSAMINE. II. LIGHT AND ELECTRON MICROSCOPIC INVESTIGATIONS OF HEPATOCELLULAR NUCLEOLAR ALTERATIONS. (Eng.) Enzan, H.; Haberle, B.; Meinhardt, K.; Schuchhardt, C.; Koch, H. K.; Lesch, R. (Res. Inst. Nuclear Medicine and Biology, Univ. Hiroshima, Kasumi-cho 1-2-3, 734 Hiroshima, Japan). *Virchows Arch.* [*Cell Pathol.*] 26(1):59-71; 1977.

To investigate the active hepatocellular response to d-galactosamine (GalN) and the relationship between structure and function in liver cells of GalN-treated rats, the effects of repeated GalN administration (i.e., subacute GalN intoxication) on rat liver cell nucleoli were examined. After an initial i.p. injection of GalN (375 mg/kg), the rats were treated with 250 mg GalN/kg body weight daily at intervals between 24 hr and 30 days. The rats were sacrificed 6 hr after the last injection by decapitation. Liver specimens were studied by light and electron microscopy. According to the nucleolar size, three stages were distinguished: (1) stage I, decreased nucleolar size after one injection; (2) stage II, increased and maximal nucleolar size after two to five injections; and (3) stage III, slightly increased relatively stable nucleolar size after six or more injections. The fine structural observations suggest a nucleolar hyperfunction in subacute GalN intoxication as well as a minor disturbance of the transcription and the transfer of the nucleolar RNA.

5205 RELATION OF THE SIZE OF FUNCTIONAL HEPATIC CELL MASS TO THE CLEARANCE OF INDOCYANINE GREEN. (Eng.) Kojima, H. (Nagoya Univ. Sch. Medicine, Nagoya, Japan). *Nagoya J. Med. Sci.* 40(1):47-55; 1978.

Because the fractional clearance (K) of indocyanine green (ICG) is considered to be indicative of the amount of functional hepatic cell mass as well as the degree of hepatocellular damage, the correlation between K of ICG and the size of hepatic cell mass altered by functional hepatectomy as well as the degree of hepatic damage induced by carbon tetrachloride (CCl_4) was investigated in the dog. A <20% functional hepatectomy produced only a minimal decrease (-3.3 ± 1.5% for 13.7 ± 3.1% hepatectomy) in K of ICG, probably due to the potential functional reserve of the liver, while in dogs with a >70% functional hepatectomy, K of ICG was remarkably decreased (-44.0 ± 6.3 to -72.4 ± 3.3% for 71.5 ± 2.9 to 86.8 ± 2.5% hepatectomy). K of ICG was negatively correlated ($r=-0.88$, $p<0.001$) with the magnitude of functional hepatectomy, i.e., the size of remaining functional hepatic cell mass. Large doses of CCl_4 (1.0, 1.5, and 2.0 ml/kg, i.v.) induced remarkable decreases (-10.8 ± 19.2, -11.5 ± 21.0, and -52.6 ± 12.2%, resp.) in K of ICG, associated with the increasing degrees of hepatic cell necrosis, whereas CCl_4 in smaller doses (0.5 and 1.0 ml/kg, i.v.) activated hepatic cell function as reflected by higher K values (22.9 ± 1.8 and 20.3 ± 15.9%, resp.). It is concluded that K of ICG is a reliable indicator of hepatic cell function in acute or subacute hepatic cell damage.

5206 EFFECT OF PHENOBARBITAL AND DIETHYL MALEATE ON CARBON TETRACHLORIDE TOXICITY IN ISOLATED RAT HEPATOCYTES. (Eng.) Lindstrom, T. D.; Anders, M. W.; Remmer, H. (Dept. Pharmacology, Univ. Minnesota, Minneapolis, MN 55455). *Exp. Mol. Pathol.* 28(1):48-57; 1978.

The effects of phenobarbital (PB) and the glutathione depleting agent, diethyl maleate (DEM), on CCl_4 hepatotoxicity were investigated in isolated rat hepatocytes. The administration of DEM (0.6 mg/kg, i.p.) significantly decreased hepatocyte glutathione (GSH) levels both *in vivo* and *in vitro*. The addition of CCl_4 (400 and 800 µg/ml) to hepatocyte suspensions resulted in increased malondialdehyde formation in cells isolated from DEM- or DEM plus PB-treated rats. Both concentrations of CCl_4 increased lactate dehydrogenase release in cells isolated from DEM-plus PB-treated rats; however, 800 µg/ml, but not 400 µg/ml, of CCl_4 caused moderate lactate dehydrogenase (LDH) release in cells isolated from DEM-treated rats. Treatment with PB alone resulted in increased LDH release in hepatocytes exposed to 800 µg/ml of CCl_4; no significant effects were observed at the 400 µg/ml level. However, hepatocytes isolated from rats treated with PB alone did not exhibit significant malondialdehyde formation at either 400 or 800 µg/ml of CCl_4. The addition of 800 µg/ml of CCl_4 to hepatocytes isolated from PB-treated rats produced maximal LDH release, which was not further increased by treatment with DEM. These results show that an increased rate of CCl_4 bioactivation produces a more prominent effect on LDH release than on malondialdehyde formation; in contrast, lowered levels of reduced glutathione were associated with increased malondialdehyde formation.

5207 EFFECT OF PHENOBARBITAL ON THE INTRAHEPATIC METABOLISM OF BILIRUBIN. (Rus.) Oleinik, A. N. (Medical Inst., Ternopol, USSR). *Klin. Med. (Mosk.)* 56(2):27-33; 1978.

Various aspects of the effect of phenobarbital (PB) on the formation, transport, and excretion of bilirubin are reviewed. Single and repeated administration of PB to random bred rats (3-10 mg/100 g) stimulated the excretory function of the liver: there was a 3.5-4.5-fold increase in the total amount of the pigment excreted into the bile. PB was used in the treatment of various liver and biliary duct diseases, especially of those accompanied by hyperbilirubinemia. The efficacy of PB was markedly greater in the patients with Gilbert's syndrome than in patients with Crigler-Najjar syndrome. Administration of PB in minimal sedative doses (0.02 mg/day) to women during the last days (weeks) of pregnancy was found to be effective against the physiological jaundice of newborns. PB (0.03 g, t.i.d. for 10 days) was effective against both early and long-term residual manifestations of acute viral hepatitis.

5208 AN ANALYSIS OF DATA ON HUMAN HEPATIC BILE. RELATIONSHIP BETWEEN MAIN BILE COMPONENTS, SERUM CHOLESTEROL AND SERUM TRIGLYCERIDES. (Eng.) van der Linden, W.; Bergman, F. (Lasarettet, S-831

01 Ostersund, Sweden). *Scand. J. Clin. Lab. Invest.* 37(8):741-747; 1977.

Data on serum and hepatic bile from 97 patients were subjected to statistical analysis to determine the relationship between different bile constituents and serum cholesterol and triglycerides. Hepatic bile samples were obtained from the common duct during operations for uncomplicated gallstone disease; serum cholesterol and triglycerides levels were determined prior to operation. A highly significant rank correlation was found between the cholesterol and phospholipid molar fractions (r_S=0.37, p<0.001). The rank correlation between the cholesterol molar fraction and the bile acid/phospholipid ratio was significant and negative (r_S=-0.58, p<0.001), suggesting that a rise of cholesterol in human bile is accompanied by a decrease of the bile acid/phospholipid ratio as is the case in all animal models studied so far. A significant correlation (r_S=0.28, p<0.01) was found between chenodeoxycholic acid (CDCA) and the ratio between cholic acid (CA) and deoxycholic acid (DCA). Low CDCA values were associated with high lithogenicity and low DCA values with low lithogenicity. In a mathematical function representing the relationship between the biliary cholesterol/serum cholesterol ratio and the bile acid pattern, the ratio rose with increasing DCA values and with increasing absolute differences between the CDCA and CA levels, confirming the impression obtained from the experimental data. Statistical analysis confirmed the significance of the apparent correlation (r_S=0.31, p<0.001). There were significant correlations between the serum triglyceride level and the cholesterol molar fraction (r_S=0.25, p<0.01) and between the triglyceride level and the phospholipid molar fraction (r_S=0.28, p<0.01). Serum triglycerides were negatively correlated with the bile acid molar fraction (r_S=-0.32, p<0.001) and with the absolute concentration of bile acids (r_S=-0.26, p<0.01), resulting in an association between serum triglycerides and lithogenicity.

5209 INHIBITION OF BILE SALT EXCRETION AND BILE FLOW BY SPASMOLYTIC DRUGS: AN ADDITIONAL THERAPEUTIC EFFECT OF BILIARY COLICS? (Eng.) Klapdor, R.; Sepehr, H. (Universitats-Krankenhaus Eppendorf, Martinistr. 52, 2000 Hamburg 20, W. Germany). *Arzneim. Forsch.* 28(1):46-48; 1978.

Studies were carried out to determine whether the therapeutic effect of spasmolytic drugs in biliary colic might be caused by the depression of intraluminal pressure due to a decrease in bile salt-dependent bile flow. The influence of the spasmolytic drugs hyoscin-*N*-butylbromide (HBB) and Extractum opii (E. opii) on bile flow, bile salt excretion, and bilirubin excretion was investigated in cholecystectomized, unanaesthetized pigs, and the results were compared with those after acute, quantitative interruption of the enterohepatic circulation (EHC) by biliary drainage. Both HBB (0.46 ± 0.04 mg/min/kg, 60 min, i.v.) and E. opii (0.6 ± 0.3 drops/min/kg, intraduodenally) induced a marked decrease in both bile flow (to 55 ± 4% and 74 ± 25% of initial values by HBB and E. opii, resp.) and bile salt excretion (to 25 ± 16% and 51 ± 23% of initial values by HBB and E. opii, resp.). These decreases showed a significant linear correlation whether induced by HBB or E. opii (r=0.994, p<0.01 and r=0.983, p<0.01, resp.). Interruption of the EHC by biliary drainage decreased bile flow to 10 ± 5% of the initial value and bile salt excretion to 55 ± 5% of the initial value; these decreases also showed a significant linear correlation (r=0.963, p<0.01). Bilirubin excretion was unchanged by interruption of the EHC, by HBB, or by E. opii. These results support the hypothesis that these spasmolytic drugs lower the intraluminal pressure by inhibiting bile salt-dependent bile flow.

5210 ALTERATIONS IN BILE FLOW AND Na$^+$-K$^+$ BILIARY EXCRETION INDUCED BY THEOPHYLLINE AND ETHACRYNIC ACID. (Eng.) Knodell, R. G. (Veterans Admin. Hosp., Albuquerque, NM 87108). *Proc. Soc. Exp. Biol. Med.* 157(2):306-311; 1978.

To investigate the mechanism of the bile salt independent flow (BSIF) and the bile salt dependent flow (BSDF) of hepatic canalicular bile, the effectiveness of theophylline (a phosphodiesterase inhibitor) and ethacrynic acid (a Na$^+$-K$^+$-ATPase inhibitor) in increasing BSIF bile production was investigated in male Walter Reed rats. Theophylline (TH, 20 mg/kg i.v.) was given 15 min before the start of bile collection, and ethacrynic acid (EA, 10 mg/kg i.v.) was given both 15 min before the start of bile collection and again halfway through the 1-hr collection period. ^{14}C-erythritol clearance showed a linear relationship to total bile flow and the bile/plasma ^{14}C ratios approximated unity and were not significantly different in control animals and in both the TH- and EA-treated groups, suggesting that the drugs did not alter bile flow. However, both agents significantly (p<0.001) increased the fraction of erythritol clearance that was independent of bile salt output (i.e., BSIF) compared to controls. TH produced a significant (p<0.001) decrease in the erythritol clearance generated per unit of bile acid secreted (i.e., in BSDF) compared to controls, while EA significantly increased (p<0.025). Bile flow was linearly related to total Na$^+$ biliary excretion and there was no significant difference in the amount of bile flow generated per unit of Na$^+$ excretion in all three groups. But TH and EA caused an increase (p<0.05 for TH) in the Na$^+$-independent bile flow, compared to controls. The amount of bile secreted per unit of biliary K$^+$ excreted was increased by both TH (p<0.05) and EA, and both agents caused a significant increase (p<0.05) in K$^+$-independent bile flow. It is concluded that both agents significantly enhance BSIF. However, they also produced alterations in BSDF flow that suggest that they influence multiple steps in the bile secretory process.

5211 BILIRUBIN DYNAMICS IN THE GUNN RAT DURING PHOTOTHERAPY. (Eng.) Calvert, R. T.; Hulshoff, A.; Buice, R. G.; Kostenbauder, H. B.

(Dept. Pharmacy, Univ. Manchester, Manchester M13 9PL, England). *J. Pharm. Sci.* 67(2):205-209; 1978.

To develop a kinetic model for the formation, distribution, and elimination of bilirubin, bilirubin dynamics were studied in homozygous Gunn rats under normal room lighting conditions and under conditions simulating phototherapy. Each rat received an i.v. ^{14}C-bilirubin dose of 200,000-660,000 disintegrations/min. The decrease in plasma bilirubin concentration during illumination with low intensity (300 footcandles, fc) or high intensity (1,000-1,100 fc) was studied. The plasma bilirubin concentration decreased under phototherapy until a new steady-state concentration was reached, with the decline being more rapid under high intensity light conditions. The rats were also injected with a tracer dose of ^{14}C-bilirubin following a period of illumination with low or high intensity light. The distribution and elimination of the labeled bilirubin were then followed under continuous illumination. The data obtained from these experiments were computer fitted to 10 kinetic models, one of which was determined to be the best possible model to account for both the low and high intensity light data. The selected model is a three-compartment model with zero-order elimination from the slowly miscible peripheral compartment.

5212 CHARACTERISTICS OF α-FETOPROTEIN-CONTAINING HEPATOCYTES IN THE REGENERATING MOUSE LIVER.

(Rus.) Lazareva, M. N. (N.F. Gamaleya Inst. Epidemiology and Microbiology, Moscow, USSR). *Biull. Eksp. Biol. Med.* 84(7):97-101; 1977.

To evaluate the characteristic features of localization of α-fetoprotein (α-FP) in regenerating rat liver, SWR mice were exposed to CCl_4 vapors (0.001-0.005 ml/3 l); on day 2-3 after intoxication mice were sacrificed and the location of α-FP in the liver sections was assayed by an indirect immunofluorescence technique. Intoxication with CCl_4 induced synthesis of α-FP; the increase depended upon the age of the mice. In 13-day-old mice, α-FP was detected in 30% of hepatocytes, compared with 15-20% in 3-week-old mice and 5-7% in 2- to 3-month-old mice. The majority of α-FP-containing hepatocytes were located in the region adjacent to the necrosis foci.

5213 EFFECT OF KUPFFER CELL BLOCKADE AT DIFFERENT PERIODS BEFORE AND AFTER PARTIAL HEPATECTOMY ON HEPATOCYTE REGENERATION.

(Rus.) Mayanskii, D. N.; Shcherbakov, V. I.; Mirokhanov, Iu. M. (Inst. Clinical and Experimental Medicine, Novosibirsk, USSR). *Biull. Eksp. Biol. Med.* 84(11): 616-618; 1977.

To evaluate the role of Kupffer cells in the processes of liver regeneration, partially hepatectomized Wistar rats were inoculated i.v. with a 10% suspension of carbonyl iron (1 ml). Animals were divided into three groups: rats in group 1 were inoculated 2 hr prior to the partial (2/3) hepatectomy, rats in group 2 were inoculated 3 hr after, and rats in group 3 were inoculated 18 hr after the hepatectomy. Rats were sacrificed 24, 32, 48, and 72 hr after partial hepatectomy, and at each time point the mitotic index (MI) and index of labeled mitoses (ILM) were measured. Inhibition of hepatocyte proliferation was detected in all rats treated with carbonyl iron, but the block of mononuclear phagocytes was more effective in rats from groups 1 and 2 and less effective in rats from group 3 (i.e., in the period of intensive DNA synthesis).

5214 ESTERASE SPECTRA IN HEPATOCYTES AND KUPFFER'S CELLS OF THE REGENERATING LIVER.

(Rus.) Grishanova, A. Yu.; Shcherbakov, V. I.; Mayanskii, D. N. (Inst. Clinical and Experimental Medicine, Novosibirsk, USSR). *Biull. Eksp. Biol. Med.* 84(7):44-46; 1977.

The starch gel electrophoresis assay was employed for evaluation of the multiple forms of esterase in hepatocytes and Kupffer cells derived from partially hepatectomized Wistar rats. The electrophoretogram of esterase from intact hepatocytes and Kupffer cells consisted of six and five bands, resp. Within the first 2-3 hr after hepatectomy, esterase spectra in both hepatocytes and Kupffer cells consisted of four bands each; 9 hr after hepatectomy, the spectra showed normalization. Complete normalization of the esterase pattern in the hepatocytes was detected 48 hr after hepatectomy, while in Kupffer cells deviations from the normal pattern were observed even 72 hr after hepatectomy.

5215 UNEVEN DISTRIBUTION OF ENZYMATIC ALTERATIONS ON THE LIVER CELL SURFACE IN EXPERIMENTAL EXTRAHEPATIC CHOLESTASIS OF RAT.

(Eng.) Toda, G.; Kako, M.; Oka, H.; Oda, T.; Ikeda, Y. (First Dept. Internal Medicine, Univ. Tokyo, 3-1, Hongo 7-chome, Bunkyoku, Tokyo, Japan). *Exp. Mol. Pathol.* 28(1):10-24; 1978.

The effect of bile duct ligation on enzyme activities in the subfractions of the rat liver plasma membrane was investigated. Two subfractions were isolated from the rat liver plasma membrane by homogenization and subsequent centrifugation in a discontinuous sucrose gradient. The light subfraction contained fragments of the bile canalicular surface and the heavy subfraction contained fragments of the sinusoidal and lateral surfaces of the hepatocyte. Bile duct ligation decreased Na-K-ATPase and Mg-ATPase activity in the light subfraction, whereas it had no significant effect on these enzyme activities in the heavy subfraction. Leucyl-β-naphthylamidase activity was reduced and alkaline phosphatase activity was increased in both subfractions. These results suggest that the bile duct ligation leads to loss of the secretory polarity of the liver cell. The *in vitro* effects of some bile acids (taurine conjugates of cholate, chenodeoxycholate, lithocholate, and ursodeoxycholate) on the membrane-bound enzymes in the light subfraction were investigated. Taurocholate did not inhibit Na-K-ATPase activity even at 10 mM, whereas the same concentration of taurochenodeoxycholate and taurolithocholate inhibited it completely.

Mg-ATPase activity was inhibited by 25% at 10 mM taurocholate, and increasing the concentration to 100 mM did not enhance the extent of inhibition. Taurochenodeoxycholate and taurolithocholate at 100 mM inhibited Mg-ATPase activity by 65% and 85%, resp. These results indicate that taurine conjugates of chenodeoxycholate and lithocholate inhibit both Na-K ATPase and Mg-ATPase activities in the light fraction, whereas taurine conjugates of cholate and ursodeoxycholate are far less inhibitory. These results may be consistent with the hypothesis that chenodeoxycholic acid is involved in the alteration of enzyme activities in the bile canalicular membrane.

5216 EXPERIMENTAL STUDIES ON ETIOLOGY OF PORTAL HYPERTENSION IN ALLERGIC ASPECT.

(Eng.) Nakao, M.; Nagaishi, T.; Inoue, M.; Kimachi, H.; Koga, S. (Tottori Univ. Sch. Medicine, Yonago, Tottori Prefecture, Japan). *Jpn. J. Surg.* 7(4): 269-278; 1977.

The role of allergic factors in the etiology of portal hypertension in Banti's syndrome (idiopathic portal hypertension) was examined in healthy adult rabbits that had been sensitized by intragluteally injected ovalbumin (3 ml of 1% suspension at 3-day intervals for up to 200 days). The splenic weight was 0.9 g in the control group but ranged from 3.0 to 5.9 g in the sensitized group. The spleen tended to be atrophied in the late stage of sensitization and showed fibroplasia. The liver showed a slight swelling tendency in the sensitized rabbits. Liver cells in the late stages of sensitization showed hypochromasia, swelling and anisocytosis, and irregular hepatic cords. Portal hypertension was detected in 80% of sensitized rabbits. Injection of 30 ml of ovalbumin into a blocked and evacuated portion of the upper jejunum 3 days after the end of the sensitization period resulted in an increase in portal pressure in 80% of the sensitized rabbits compared with no change in controls. The degree of induced portal pressure elevation was not affected by the duration of sensitization. Injection of the antigen into various other sites indicated that the pressure-elevating mechanism operates at sites central to the area of the superior mesenteric vein (probably at the hepatic level). It is suggested that the pressure elevation arises from an antigen-antibody reaction caused by absorption of the intraintestinally injected antigen into the portal system with its antigenicity maintained, suggesting the importance of alimentary factors in the genesis of this syndrome.

5217 SODIUM RETENTION AND ASCITES FORMATION IN DOGS WITH EXPERIMENTAL CIRRHOSIS.

(Eng.) Levy, M. (Dept. Physiology, McGill Univ., Montreal, Quebec H3G 1Y6, Canada). *Am. J. Physiol.* 233(6):F572-F585; 1977.

To study the temporal relationships between urinary sodium retention, plasma volume expansion, and ascites formation, liver cirrhosis was induced in dogs by the sporadic feeding of dimethylnitrosamine (0.10-0.15 ml on 2 consecutive days). Sodium retention started about 16 days following the onset of cirrhosis and preceded ascites formation by about 10 days. Plasma volume increased by 9% ($p<0.05$) within 3 to 4 days of sodium retention and expanded further as ascites accumulated. Splanchnic plasma volume was greater by 161 ml in 10 cirrhotic dogs with ascites than in 14 normal dogs. Nonsplanchnic volume was greater by 96 ml ($p<0.05$). Thus, the "effective" as well as the splanchnic component of the vascular space was expanded. Paracentesis did not cause the reformation of ascites in five dogs as long as dietary salt was denied. Refeeding permitted reaccumulation of ascites and further plasma volume expansion. Renal perfusion remained constant as dogs became progressively cirrhotic. It is concluded that ascites formation depends on the prior retention of urinary sodium, and occurs as an "overflow" phenomenon. A contracted effective plasma volume does not appear to be necessary for continuing sodium retention.

5218 SODIUM RETENTION IN DOGS WITH CIRRHOSIS AND ASCITES: EFFERENT MECHANISMS.

(Eng.) Levy, M. (Dept. Physiology, McGill Univ., Montreal, Quebec H3G 1Y6, Canada). *Am. J. Physiol.* 233(6): F586-F592; 1977.

The efferent mechanisms for sodium retention were investigated in dogs with dimethylnitrosamine-induced cirrhosis and ascites. Renal micropuncture revealed that the single nephron glomerular filtration rate (GFR), proximal tubular TF/P inulin level, and distal delivery of filtrate remained normal throughout the course of cirrhosis, even after acute saline loading. Plasma levels of renin, aldosterone, estrogens, and progesterone remained normal in the salt-retaining nonascitic phase of cirrhosis, but rose when ascites was present. Blood pressure was normal throughout the period of observation, but cardiac output rose by 20% in advanced cirrhosis with ascites. Renal denervation and the infusion of alpha- or beta-adrenergic blocking agents to saline-loaded cirrhotic dogs with ascites did not induce a natriuresis. The left kidney responded normally to vasodilatation with intra-arterial acetylcholine bromide (60-80 μg/min), but even when systemic arterial pressure was simultaneously elevated with norepinephrine, no natriuresis ensued. The major efferent mechanism mediating the tubular retention of sodium has not yet been identified in this canine model of cirrhosis. A distal nephron site appears to be responsible for most of the sodium retention.

5219 THE EFFECT OF CHOLAGOGIC DRUGS ON VOLUMETRIC SODIUM EXCRETION IN RATS WITH EXPERIMENTAL LIVER DYSTROPHY.

(Rus.) Iakovlev, V. E. (Dept. Pharmacology, Medical Inst., Chernovtsy, USSR). *Farmakol. Toksikol.* 41(1):73-76; 1978.

The effect of cholagogic agents on sodium excretion was studied in random-bred rats with CCl_4-induced (0.4 ml/100 g/day, s.c., for 4 days) liver dysfunction. On day 3 from the initiation of intoxication, animals started to receive dehydrocholic acid (250 mg/kg), flamine (50 mg/kg), or sodium selenite (30 µg/kg). The cholagogics were given for 7 days. Experimental liver dystrophy resulted in a significant decrease of sodium excretion (3.0 ± 0.22 µEq/hr compared to 4.1 ± 0.26 µEq/hr in intact controls, $p<0.01$). Administration of dehydrocholic acid, flamine, and sodium selenite increased sodium excretion (to 5.4 ± 3.9, 6.7 ± 0.45, and 6.4 ± 0.42 µEq/hr, resp., compared to 3.7 ± 0.35, 5.3 ± 0.37, and 4.4 ± 0.31 µEq/hr, resp., in controls; $p<0.01$, $p<0.05$, and $p<0.01$, resp.).

5220 ON THE PATHOGENESIS OF GALACTOSAMINE HEPATITIS. INDICATIONS OF EXTRAHEPATOCELLULAR MECHANISMS RESPONSIBLE FOR LIVER CELL DEATH.

(Eng.) Liehr, H.; Grun, M.; Seelig, H. P.; Seelig, R.; Reutter, W.; Heine, W. D. (Dept. Medicine, Univ. Wurzburg, Josef-Schneider-Str. 2, D-8700 Wurzburg, W. Germany). *Virchows Arch.* [*Cell Pathol.*] 26(4): 331-344; 1978.

The action of galactosamine on isolated mast cells from male Wistar rats and alterations in the complement system during the course of galactosamine-induced injury were studied to evaluate the pathogenesis of galactosamine hepatitis. Galactosamine (0.01 ml of a 1 M solution) induced degranulation of 100% of the cells within 1 min. Degranulation was observed in 90-100% of the mast cells of the peritoneal fluid aspirated 10 min after the i.p. injection of 1 g/kg galactosamine; after 3 hr, degranulation of the mast cells in the intestine was complete but no degranulation was observed in other organs. Endotoxemia developed from 3 hr after galactosamine injection. Sequential measurements of the complement hemolytic activity during the course of galactosamine hepatitis in rats revealed a biphasic decrease; the first decrease (to 70% of normal) coincided with the first appearance of liver cell necrosis (0-9 hr), and the second decrease (to 20% of normal) coincided with massive cell death and inflammation (9-48 hr). Necrotic liver parenchymal cells accumulated the third component of the complement system at 24 hr. Mice of the NMRI strain, which have 0-30% of the hemolytic activity of the control C57BL strain, developed endotoxemia (72% at 6 hr, 83% at 12 hr, 87% at 48 hr) but did not develop liver cell necrosis or inflammation after galactosamine administration, whereas the C57BL mice did. It is concluded that two mechanisms act together to produce galactosamine-induced liver lesions: a series of extrahepatic events resulting in histaminemia, endotoxemia, and complement activation act synergistically with a biochemical alteration that occurs within the hepatocyte during galactosamine metabolism to produce liver cell necrosis and inflammation.

5221 EFFECT OF TRITON WR 1339 ON THE ULTRASTRUCTURE OF PARENCHYMAL AND STROMAL LIVER CELLS IN RATS WITH CHRONIC TOXIC HEPATITIS.

(Rus.) Vakulin, G. M.; Korolenko, T. A.; Titova, V. G.; Yakobson, G. S. (Central Res. Lab., Medical Inst., Novosibirsk, USSR). *Tsitologiia* 19(11):1281-1284; 1977.

The ultrastructural manifestations of the protective effect of the detergent Triton WR 1339 (polyoxyethyl-tert-octylphenylmethylene) were studied in Wistar rats with CCl_4-induced chronic hepatitis. Four hours prior to the first CCl_4 inhalation (intoxication lasted 3 weeks), the animals received a single i.p. injection of Triton WR 1339 (85 mg/100 g); 21 days later, the animals were sacrificed, and liver specimens were analyzed under the electron microscope. Triton WR 1339 administration activated pinocytosis in hepatocytes and Kupffer cells, stimulated Golgi bodies, and enhanced phagocytosis by triton-filled lysosomes.

5222 THE MECHANISM OF DISTURBED ENERGY FORMATION IN ACUTE LIVER ISCHEMIA.

(Rus.) Levandovsky, I. V.; Lyakhovich, V. V.; Panov, A. V.; Soloviev, V. N.; Tsyrlov, I. B.; Iksman, T. M. (Lab. Organ and Tissue Transplantation, USSR Acad. Medical Sciences, Moscow, USSR). *Biull. Eksp. Biol. Med.* 84(9):301-303; 1977.

The effect of acute ischemia or of treatment with ischemic toxin (IT) on mitochondrial respiration was studied in Wistar rats. *In vitro* treatment of the mitochondria with IT significantly accelerated the respiration process. Incubation of the IT-treated mitochondria with dithiotreitol or with cytochrome C decreased the rate of oxidation. Similar changes were observed in mitochondria isolated from rats with induced liver ischemia (ligation of hepatic artery and portal vein).

5223 LIVER COLLAGEN HYDROXYLATION IN MURINE SCHISTOSOMIASIS.

(Eng.) Dunn, M. A.; Maragondakis, M. E.; Hait, P. K. (Albert Einstein Coll. Medicine, Bronx, NY 10461). *Biochim. Biophys. Acta* 538(2):328-333; 1978.

To evaluate the role of procollagen prolyl hydroxylase (PPH) in liver fibrosis, the activity of PPH was measured in fibrotic liver obtained from mice with hepatosplenic schistosomiasis, an animal model of the most prevalent form of human liver fibrosis. Measurable activity of PPH in fibrotic liver supernatants was 47-fold higher (2.22 ± 0.35 disintegrations/min[dpm]/mg liver protein) than that of normal liver (0.08 ± 0.05 dpm/mg liver protein). The effect of PPH inhibition on collagen synthesis in fibrotic liver slices was studied using 8,9-dihydroxy-7-methyl benzo[b]quinolizinium bromide (GPA 1734). This compound was shown in other systems to inhibit prolyl and lysyl hydroxylations by iron chelation at concentrations that did not affect total protein synthesis. The formation of nondialyzable labeled hydroxyproline was inhibited by 40, 70, and 95% at 30, 50, and 100 µM GPA 1734, resp. Incorporation of proline into total liver protein was unaffected at 30 and 50 µM but was inhibited 20% at 100 µM GPA 1734. Underhydroxylated collagen synthesized by liver slices with GPA 1734 was extracted with neutral salt solution and was subsequently hydroxylated with partially purified PPH to the same extent as control material synthesized in the absence of GPA 1734. The increased activity of PPH in murine schistosomiasis, the possibility that this enzyme may be rate-controlling in collagen deposition, and the possibility that its inhibition may be therapeutically useful in liver fibrosis warrant further study.

5224 THE ENTEROHEPATIC CIRCULATION OF BILE ACIDS IN MAN. (Eng.) Hofmann, A. F. (No affiliation given). *Clin. Gastroenterol.* 6(1): 3-24; 1977.

5225 SPECIFICITY AND INTERRELATION OF BILE ACID SYNTHESIS IN THE BABOON [Abstract]. (Eng.) Redinger, R. N.; Grace, D. M. (Univ. Hosp., London, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1164; 1977.

5226 ENTEROHEPATIC CIRCULATION OF SILICON IN MAN [Abstract]. (Eng.) Dobbie, J. W.; Gray, M. J. B.; Imrie, C. W. (Glasgow Royal Infirmary, Glasgow, Scotland). *Gut* 18(5):A400; 1977.

5227 STUDIES ON THYROXINE-BINDING GLOBULIN (TBG); CARBOHYDRATE STRUCTURE AND LIVER BINDING [Abstract]. (Eng.) Zinn, A. B. (Case Western Reserve Univ., Cleveland, OH 44106). *Diss. Abstr. Int.* [*B*] 38(2):672-B; 1977.

5228 INCREASED RADIOIMMUNOACTIVE VASOINTESTINAL PEPTIDE (VIP) IN THE CEREBROSPINAL FLUID (CSF) OF DOGS IN HEPATIC FAILURE. [Abstract]. (Eng.) Ebeid, A. M.; Smith, A. R.; Escourrou, J. C.; Murray, P.; Fischer, J. E. (Massachusetts General Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1172; 1977.

5229 ETIOLOGY OF HEPATIC STEATOSIS IN OBESE RATS UNDERGOING SMALL BOWEL BYPASS [Abstract]. (Eng.) Kaminski, D. L.; Jellinek, M.; Ruwart, M.; Mueller, E.; Menz, L. (Dept. Surgery, St. Louis Univ., St. Louis, MO). *Gastroenterology* 72(5, Part 2):1077; 1977.

5230 TOLERANCE OF THE PIG LIVER TO ISCHAEMIA [Abstract]. (Eng.) Balderson, G.; Battersby, C.; Woodruff, P.; Cavanagh, A.; Furnival, C. (Dept. Surgery, Univ. Queensland, Queensland, Australia). *Aust. N.Z. J. Surg.* 47(1):110; 1977.

5231 REGULATION OF LIVER REGENERATION BY PANCREATIC HORMONES [Abstract]. (Eng.) Duguay, L. R.; Skivolocki, W. P.; Lee, S.; Orloff, M. J. (Univ. California, San Diego, CA). *Gastroenterology* 72(5, Part 2):1053; 1977.

5232 DIURNAL RHYTHM AND SPECIFICITY OF ACTION OF HEPATIC REGENERATIVE STIMULATOR SUBSTANCE (SS) [Abstract]. (Eng.) LaBrecque, D. R.; Bachur, N. R. (Baltimore Cancer Res. Center, Natl. Cancer Inst., Baltimore, MD). *Gastroenterology* 72(5, Part 2):1179; 1977.

5233 IMPAIRED DRUG METABOLISM AFTER JEJUNOILEAL BYPASS IN RATS [Abstract]. (Eng.) Tuma, D. J.; Vanderhoof, J. A.; Sorrell, M. F. (Univ. Nebraska Medical Center, Omaha, NB). *Clin. Res.* 25(4):575A; 1977.

5234 BRAN AND BILE: TIME-COURSE OF CHANGES IN NORMAL YOUNG MEN GIVEN A STANDARD DOSE [Abstract]. (Eng.) Heaton, K. W.; Wicks, A. C. B. (Bristol Royal Infirmary, Bristol, England). *Gut* 18(11):A951; 1977.

5235 EVALUATION OF A TOTALLY SYNTHETIC MEDIUM FOR ISOLATED GUINEA-PIG LIVER PERFUSION [Abstract]. (Eng.) Roeser, H. P.; Mack, S.; Cooksley, W. G. E. (Dept. Medicine, Univ. Queensland, Queensland, Australia). *Clin. Exp. Pharmacol. Physiol.* 4(5):468; 1977.

5236 ALTERED BLOOD BRAIN BARRIER TO AMINO ACIDS AFTER PORTACAVAL SHUNT [Abstract]. (Eng.) Escourrou, J.; James, J. H.; Fischer, J. E. (Massachusetts General Hosp., Boston, MA). *Gastroenterology* 73(5):1219; 1977.

5237 FACTORS INFLUENCING $^{14}CO_2$ PRODUCTION FROM AMINOPYRINE IN THE RAT [Abstract]. (Eng.) Hart, F. E.; Willson, R. A.; Hew, J. T. (Dept. Medicine, Univ. Washington, Seattle, WA). *Gastroenterology* 73(5):1224; 1977.

5238 REGULATION OF ALBUMIN SYNTHESIS IN HUMAN HEPATOCELLULAR CARCINOMA CELLS IN CULTURE (HCC) WHICH SYNTHESIZE BUT DO NOT SECRETE ALBUMIN [Abstract]. (Eng.) Weigand, K.; Alpert, E.; Isselbacher, K. J. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 73(5):1254; 1977.

5239 CHARACTERIZATION OF HEPATIC INJURY AFTER JEJUNOILEAL BYPASS IN RATS [Abstract]. (Eng.) Vanderhoof, J. A.; Tuma, D. J.; Sorrell, M. F. (Univ. Nebraska Medical Center, Omaha, NB). *Gastroenterology* 73(5):1251; 1977.

5240 DISPARATE Na^+-REQUIREMENT OF BILE ACID AND DYE UPTAKE BY ISOLATED HEPATOCYTES [Abstract]. (Eng.) Minder, E.; Paumgartner, G. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Digestion* 16(4):337; 1977.

5241 NORMALIZATION OF PLASMA TOTAL AND FREE TRYPTOPHAN IN DOGS WITH CHRONIC PORTACAVAL ANASTOMOSIS FOLLOWING INFUSION OF SELECTED AMINO ACID SOLUTIONS [Abstract]. (Eng.) Salerno, F.; Manneschi, M.; Ricci, A.; Bernardi, R. (Istituto di Clinica Medica III, Universita di Milano, Milano, Italy). *Digestion* 16(4):363; 1977.

5242 ANTICHOLERETIC EFFECTS OF AMINO ACIDS (AA) [Abstract]. (Eng.) Preisig, R.; Rennert, O. (Dept. Clinical Pharmacology, Univ. Berne, Berne, Switzerland). *Digestion* 16(4):362-363; 1977.

5243 SOME IMMUNOCHEMICAL PROPERTIES OF THE HEPATITIS B SURFACE ANTIGEN [Abstract]. (Eng.) Portocala, R.; Papaevangelou, G.; Kremastinou, J.; Stathakos, D. (Inst. Virology "Stefan S. Nicolaou," Bucharest, Rumania). *Digestion* 16(4): 361; 1977.

5244 DEMONSTRATION OF HEPATITIS A ANTIGEN IN THE CYTOPLASM OF HEPATOCYTES BY IMMUNOFLUORESCENCE [Abstract]. (Eng.) Mathiesen, L. R.; Feinstone, S. M.; Purcell, R. H. (State Serum Inst., Copenhagen, Denmark). *Digestion* 16(4):360; 1977.

5245 ETIOLOGY OF HEPATITIS B. RESULTS OF A COOPERATIVE STUDY [Abstract]. (Eng.) Thomssen, R.; Gerlich, W.; Stamm, B.; Biswas, R.; Lorenz, P. R.; Majer, M.; *et al.* (Hygiene-Institut der Universitat Gottingen, Gottingen, W. Germany). *Digestion* 16(4):360-361; 1977.

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5252 PROTEIN FACTOR INVOLVED IN FATTY ACID DESATURATION OF LINOLEIC ACID. (Eng.) Catala, A.; Leikin, A.; Nervi, A. M.; Brenner, R. R. (Facultad de Ciencias Medicas, Universidad Nacional de La Plata, La Plata, Argentina). *Adv. Exp. Med. Biol.* 83:111-118; 1977.

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5255 LIVER CIRCULATION AND METABOLISM IN HAEMORRHAGIC SHOCK: AN EXPERIMENTAL STUDY WITH SPECIAL REFERENCE TO THE EFFECT OF GLUCAGON. (Eng.) Lindberg, B. (Dept. Surgery I and III, Sahlgrenska Sjukhuset, Univ. Goteborg, Goteborg, Sweden). *Acta Chir. Scand.* (Suppl. 476): 1-18; 1977.

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See also, 5106, 5151, 5311, 5320, 5321, 5322, 5323, 5339, 5348, 5372, 5599, 5754, 5756, 5782.

Intestine

5257 DEVELOPMENT OF DIGESTIVE ENZYMES IN THE PIGLET FROM BIRTH TO 8 WEEKS. II. INTESTINE AND INTESTINAL DISACCHARIDASES.

(Eng.) Aumaitre, A.; Corring, T. (Station de Recherches sur l'Elevage des Porcs, INRA-CNRZ, F-78350 Jouy-en-Josas, France). *Nutr. Metab.* 22(4):244-255; 1978.

To understand the developmental pattern of disaccharidase in pigs, the changes of intestinal mucosa, protein, and lactase, maltase, and sucrase activities were followed in the piglet between day 105 of gestation and 8 weeks after birth. The total amount of mucosa collected was small in the duodenum but larger and similar in the jejunum and ileum, and it varied considerably with age, the mean weight being 26, 124, and 551 g at birth, 2 weeks, and 8 weeks, resp. The total amount of protein varied greatly among animals, especially for the first 2 weeks; after 21 days, the amount of protein in g/100 g fresh weight remained essentially constant. Lactase and maltase activities appeared during fetal life in the whole of the small intestine. Activity of sucrase was recorded after the first postnatal week. Lactase activity was high at birth (1,222 U) and reached a maximum at 1 week (2,963 U); maltase activity, which was low at birth (106 U), increased by the 8th week (15,324 U). Total activities of all enzymes were low in the duodenum; lactase was most active in the jejunum. Similar activities of maltase and sucrase were found in the two distal parts of the small intestine. The specific activity (related to protein content) of lactase was very high in the duodenum at birth, reached a maximum in all intestinal tissues at the end of the 1st week after birth, and decreased afterwards. Specific maltase and sucrase activities were higher in the 2nd week, decreased between the 2nd and 4th weeks, and either increased afterwards (maltase) or decreased to the 6th-8th week (sucrase). These developmental patterns should be taken into consideration in preparing diets for piglets at different early ages of weaning.

5258 SUBCELLULAR DISTRIBUTION OF HYDROLASE ACTIVITIES FOR GLYCINE AND LEUCINE HOMOPEPTIDES IN HUMAN JEJUNUM.

(Eng.) Nicholson, J. A.; Peters, T. J. (Royal Postgraduate Medical Sch., Du Cane Rd., London, W12 OHS, England). *Clin. Sci. Mol. Med.* 54(2):205-207; 1978.

Since information on the subcellular distribution of peptidase is crucial for the interpretation of studies of peptide transport, the subcellular distribution of peptidase activities in the normal human jejunum against glycine and leucine homopeptides was investigated with an analytical fractionation technique. An 8,000 x *g*/min supernatant was prepared from homogenates of biopsy specimens and subjected to isopycnic centrifugation in a Beaufay automatic zonal rotor. The distribution of subcellular organelles in the gradient was established by measurement of organelle-specific marker enzymes. A sensitive fluorimetric assay for glycine peptidase was developed and used for the localization of peptidase activity with peptides composed of two to five glycine residues as substrates. Glycine peptidase activity was located in the cytosol and in the brush border membrane, but the distribution of activity varied markedly with the chain length of substrate: the longer the peptide the greater the proportion of activity associated with the brush border. Leucine peptidase showed a similar variation in cytosol brush border distributions. The results are consistent with concepts that suggest absorption and intracellular hydrolysis of small peptides and brush border digestion of larger peptides.

5259 EFFECTS OF VASCULAR PERFUSION ON THE ACCUMULATION, DISTRIBUTION AND TRANSFER OF 3-O-METHYL-D-GLUCOSE WITHIN AND ACROSS THE SMALL INTESTINE.

(Eng.) Boyd, C. A. R.; Parsons, D. S. (Dept. Physiology, Univ. Dundee, Dundee DD1 4HN, Scotland). *J. Physiol. (Lond.)* 274:17-36; 1978.

The influence of vascular flow on the transfer of the nonmetabolized, "actively transported" sugar 3-*O*-methyl-D-glucose (3MG) across the small intestinal epithelium was examined in vascularly perfused anuran intestine. Transfer was studied during absorption in the steady state and also during the period of transition from one steady state to another. During the steady state, the rate of absorption of 3MG from the intestinal lumen was equal to the rate of appearance in the portal venous effluent; this rate of transfer was directly related to the rate of arterial perfusion ($r=0.70$, $p<0.05$). With phlorizin (5×10^{-5} M) in the intestinal lumen, transfer across the epithelium was reduced to very low rates, which were independent of the rate of vascular perfusion. The apparent size of the tissue pool(s) of 3MG that had to be loaded to achieve the steady state rate of transfer were less than those that unloaded into the vascular bed after 3MG was removed from the intestinal lumen. This "up-down asymmetry" was abolished when phlorizin was present in the intestinal lumen during the unloading phase. When 3MG was abruptly removed from the intestinal lumen after the tissue had been previously loaded with the sugar, the rate of washout into the vascular bed could be described by the sum of two exponential terms. The two terms differed in that the rate constant of the earlier "fast" term was sensitive to the rate of vascular perfusion, while the later "slow" rate constant was insensitive to flow rate. The total quantity of 3MG that could be unloaded from the tissue into the portal venous effluent was decreased when phlorizin was present in the intestinal lumen during the unloading phase. Absorption from the lumen of the anuran intestine continued while the mesenteric circulation was interrupted. An estimate of the concentration of 3MG during the period of vascular stoppage could be made from the quantity recovered in the portal venous effluent when vascular perfusion was reinstituted ("vascular stop-flow"). The extent of the accumulation depended upon the duration of the vascular stoppage, and the presence of Na ions in the intestinal lumen was essential for accumulation to occur. The findings are discussed in relation to the transfer of 3MG between various possible compartments in the tissue during absorption. Evidence is presented that a re-uptake of previously absorbed 3MG may occur across the brush border membrane. Such a recycling of 3MG across the epithelium implies that the apparent unidirectional fluxes measured across the epithelium between the bulk phase of the lumen and the blood may underestimate the size of fluxes across the epithelium at the cellular level.

5260 INHIBITION OF VIP-STIMULATED INTESTINAL SECRETION AND CYCLIC AMP PRODUCTION BY SOMATOSTATIN IN THE RAT. (Eng.) Carter, R. F.; Bitar, K. N.; Zfass, A. M.; Makhlouf, G. M. (Medical Coll. Virginia, Richmond, VA 23298). *Gastroenterology* 74(4):726-730; 1978.

To determine the roles of vasoactive intestinal peptide (VIP) and somatostatin in the control of intestinal transport, the effect of somatostatin on colonic secretion induced by 10^{-8} M VIP, 10^{-2} M theophylline, and 2 x 10^{-3} M dibutyryl cyclic AMP (cAMP) was studied in muscle-stripped everted open rat colon sacs. The secretory response to VIP, measured as the decrease in net absorptive flow rate (μl/30 min/mg of dry weight), was maximal and equalled the responses to theophylline or cAMP. Somatostatin (10^{-5} M) blocked completely the secretory response to VIP but only partially the secretory response to theophylline or cAMP. This difference in the extent of inhibition suggested that somatostatin exerted an inhibitory effect both before and after the point of generation of intracellular cAMP. To test the hypothesis that one component of the action of somatostatin involved inhibition of the production of cAMP, measurements of this nucleotide were made in isolated rat colon cells. Control levels of cAMP measured by radioimmunoassay (12.6 ± 1.6 pmol/10^6 cells) were not affected by 10^{-5} M somatostatin. VIP (5 x 10^{-8} M) increased cAMP levels twofold ($p<0.01$), and this increase was blocked by somatostatin. The results indicate that somatostatin inhibits colonic secretion by exerting effects at two sites: one site lies at, and another beyond, the point of generation of intracellular cAMP.

5261 THE DRUG AND CARCINOGEN METABOLISM SYSTEM OF RAT COLON MICROSOMES. (Eng.) Fang, W. F.; Strobel, H. W. (Univ. Texas Medical Sch. at Houston, Houston, TX 77025). *Arch. Biochem. Biophys.* 186(1):128-138; 1978.

The drug and carcinogen metabolizing systems of rat colon mucosal enzymes were studied, and the isolation of the microsomes is described. The hydroxylation of *N*- and *O*-methyl drugs and polycyclic hydrocarbon was demonstrated in the microsomes. The hydroxylation of benzphetamine, ethylmorphine, *p*-nitroanisole, and *p*-nitrophenatole by colon microsomes was inducible two- to fourfold by pretreatment with phenobarbital/hydrocortisone. Colon microsomal benzo[α]pyrene hydroxylation was inducible 35-fold by pretreatment with β-naphthoflavone. Phenobarbital/hydrocortisone pretreatment also induced a fourfold increase in the specific content of colon microsomal cytochrome P-450, while β-naphthoflavone pretreatment caused a shift in the CO-reduced difference spectrum peak to 448 nm and an eightfold increase in the specific content of P-450. SKF 525-A (2-diethylaminoethyl-2,2-diphenylvalerate HCl), 2.0 mM, inhibited the hydroxylation of the drug benzphetamine by colon microsomes or liver microsomes by 77%. 7,8-Benzoflavone, 10 μM, inhibited the hydroxylation of the polycyclic hydrocarbon benzo[α]pyrene by colon microsomes by 76% and by liver microsomes by 44%. CO inhibited benzphetamine hydroxylation and benzpyrene hydroxylation by colon microsomes 30% and 51%, resp., at an O to CO ratio of 1:10. The K_m values of colon microsomal cytochrome P-450 reductase for the artificial electron acceptors cytochrome c, dichloroindophenol, and ferricyanide (10-77 μM) were in agreement with those for purified rat liver cytochrome P-450 reductase. These data support the conclusions that hydroxylation of drugs and polycyclic hydrocarbons is catalyzed by colon mucosal microsomes and that the hydroxylation activity is attributable to a cytochrome P-450-dependent drug metabolism system similar to that found in liver microsomes.

5262 XYLOSE CATABOLISM IN THE EXPERIMENTAL RAT BLIND LOOP SYNDROME: STUDIES, INCLUDING USE OF A NEWLY DEVELOPED d-[^{14}C]XYLOSE BREATH TEST. (Eng.) Toskes, P. P.; King, C. E.; Spivey, J. C.; Lorenz, E. (Veterans Admin. Hosp., Gainesville, FL 32602). *Gastroenterology* 74(4):691-697; 1978.

To investigate the characteristics of malabsorption seen in the blind loop syndrome, intraluminal bacterial catabolism of xylose in an experimental rat blind loop model was evaluated by means of a newly developed *d*-[^{14}C]xylose breath test. The system affords frequent determination of total CO_2 and $^{14}CO_2$ and the opportunity for post-therapy evaluation. Rats with jejunal self-filling blind loops expired 40% of an orogastric dose of *d*-[^{14}C]xylose as $^{14}CO_2$ over 6 hr, as compared with 9% in nonoperated control rats and 17% in surgical controls with self-emptying blind loops. $^{14}CO_2$ production decreased significantly with neomycin treatment of rats with self-filling blind loops ($p<0.025$) and was correlated with a significant decrease of gram-negative coliforms in jejunal contents. Small intestinal bacteria were implicated in the production of up to 76% of the $^{14}CO_2$ production by blind loop rats, with colon bacterial catabolism of unabsorbed xylose a smaller additive factor. The i.v. administration of *d*-[^{14}C]xylose demonstrated that $^{14}CO_2$ production by cellular metabolism of xylose was an insignificant part of the breath $^{14}CO_2$ output. Urinary xylose excretion was significantly decreased ($p<0.001$) in rats with self-filling blind loops by an amount correlating with the demonstrated intraluminal bacterial catabolism of xylose. Thus, intraluminal catabolism of xylose by small intestine bacteria appears to be the major determinant of the decreased urinary xylose excretion of the experimental blind loop syndrome, with colon bacterial catabolism of malabsorbed xylose a probable minor additional factor.

5263 SMALL INTESTINAL EPITHELIAL CELL KINETICS AND PROTOZOAL INFECTION IN MICE. (Eng.) MacDonald, T. T.; Ferguson, A. (Dept. Bacteriology, Univ. Glasgow, Glasgow, Scotland). *Gastroenterology* 74(3):496-500; 1978.

The effects of chronic protozoal infection on small intestinal architecture and epithelial cell kinetics, and the relationships between such infection, intraepithelial (IE) lymphocyte counts, and changes in epithelial cell kinetics were examined in mice infected with *Giardia muris* and *Hexamita muris*. The techniques used were conventional histology, quantitation of IE lymphocytes, microdissection and measurement of individual villi and crypts, and epithelial cell kinetic studies. The histology of small intestine from infected mice appeared normal, apart from the IE lymphocyte numbers. The mean lymphocyte counts in two groups of uninfected mice were 11.6 and 13.6/100 epithelial cells, and in two groups of infected mice were 17.6 and 21.8/100 cells. Dynamic studies showed that protozoal infection doubled the cell production from mean values of 6.2, 7.3, and 8.2/crypt/hr in three groups of uninfected animals to 11.8, 13.4, and 17.1/crypt/hr in groups of chronically infected mice. Cell production per villus was also influenced by protozoal infection, with values of 93, 99, and 101 cells/hr in groups of uninfected animals and 155, 162, and 180 cells/hr in infected mice. Although there was no reduction in villus height in the infected animals, radioautography using ^{3}H-thymidine confirmed that the enterocytes moved more rapidly up the sides of the villi than was the case for uninfected mice. The authors conclude that there is some impairment of the immune response to the parasites when mice are infected with *Giardia* and *Hexamita* from the neonatal period, as they were in this model.

5264 EFFECTS OF ILEAL AND CAECAL RESECTION ON THE COLON OF THE RAT. (Eng.) Scarpello, J. H. B.; Cary, B. A.; Sladen, G. E. (Royal Hosp., Sheffield, England). *Clin. Sci. Mol. Med.* 54(3): 241-249; 1978.

To investigate the role of the colon in the watery diarrhea commonly associated with distal ileal resection, the effects of this procedure on colonic secretion were investigated in rats. Rats were subjected to resection of either the distal 50 cm of small bowel, cecum, or a combined ileocecal operation. The effects on stool production and growth were observed over the following 8 weeks. Rapid adaptation, in terms of growth and the production of formed stools, was seen after ileectomy or cecectomy. This adaptation was slower and less complete after ileocecectomy. Changes in water content indicated that colonic water absorption was normal after ileectomy but impaired after ileocecectomy. After ileectomy, there was growth of the cecum but not of the colon, whereas after ileocecectomy, there was growth of the remaining colon. The intraluminal bile acid concentration in the small gut remnant was markedly decreased at 2 weeks with little change at 8 weeks after ileal resection. The colonic intraluminal bile acid concentration was only modestly increased after ileectomy or ileocecectomy. When studied by a perfusion technique *in vivo*, deoxycholate (2.5 mM) in intact rats induced a net secretion of water into the colon. In contrast, the colon of 8 week ileectomized rats absorbed water, although this was at a reduced rate compared with control rats. Deoxycholate increased mucosal cyclic AMP concentrations in the intact rats but not in the ileectomized rats. Sodium ricinoleate (5.0 mM) inhibited colonic water absorption, and when mixed with deoxycholate (2.5 mM), the effect on water transport was summatory. However, ricinoleate either alone or with deoxycholate did not alter mucosal cyclic AMP concentrations. These results demonstrate that the colon can absorb water effectively after ileectomy in spite of being exposed to increased concentrations of luminal bile acids. This ability may result in part from an altered mucosal response to secretagogues. If so, it represents a form of functional adaptation by the colon to ileal resection.

5265 BILE ACID AND FATTY ACID EFFECT ON INTESTINAL CYCLIC-AMP, Na^+K^+ ATPase AND SECRETION [Abstract]. (Eng.) Feinstein, J. D.; Coyne, M. J.; Bonorris, G. G.; Chung, A.; Schoenfield, L. J. (Cedars-Sinai Medical Center, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1183; 1977.

5266 ISOLATION AND PURIFICATION OF LITHOCHOLIC ACID METABOLITES PRODUCED BY THE INTESTINAL MICROFLORA. (Eng.) Kelsey, M. I.; Sexton, S. A. (Natl. Cancer Inst. Frederick Cancer Res. Center, P.O. Box B, Frederick, MD 21701). *J. Chromatogr.* 133(2):327-334; 1977.

5267 EVIDENCE AGAINST IMPORTANCE OF ALTERED MUCOSAL PERMEABILITY IN RICINOLEIC ACID INDUCED FLUID SECRETION [Abstract]. (Eng.) Binder, H. J.; Dobbins, J. W.; Whiting, D. S. (Yale Univ., New Haven, CT). *Gastroenterology* 72(5, Part 2): 1029; 1977.

5268 CYTOPROTECTIVE EFFECT OF ASPIRIN AND AMINOPYRINE [Abstract]. (Eng.) Robert, A.; Hanchar, A. J.; Lancaster, C.; Nezamis, J. E. (Dept. Experimental Biology, Upjohn Co., Kalamazoo, MI). *Gastroenterology* 72(5, Part 2):1120; 1977.

5269 INTESTINAL SECRETION INDUCED BY THE LAXATIVE BISACODYL [Abstract]. (Eng.) Ewe, K.; Przybylski, P.; Hachgenei, A.; Wanitschke, R. (I. Medical Dept., Johannes Gutenberg-Univ. Mainz, Mainz, W. Germany). *Gastroenterology* 72 (5, Part 2):1056; 1977.

5270 DISTRIBUTION OF CHOLECYSTOKININ ACTIVITY IN THE RAT SMALL INTESTINE. (Eng.) Schneeman, B. O.; Lyman, R. L. (Children's Hosp. Medical Center, 51st and Grove St., Oakland, CA 94609). *Digestion* 15(1):28-33; 1977.

5271 COLCHICINE INHIBITS CYCLIC AMP-MEDIATED INTESTINAL SECRETION [Abstract]. (Eng.) Notis, W. M.; Field, M.; Glickman, R. M. (Beth Israel Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1108; 1977.

5272 HUMAN ENTEROKINASE (EK)--CHARACTERIZATION, SUBCELLULAR LOCALIZATION AND DEVELOPMENT [Abstract]. (Eng.) Lebenthal, E. (Harvard Medical Sch., Boston, MA). *Gastroenterology* 72(5, Part 2):1087; 1977.

5273 FOLATE BINDING PROTEIN IN THE SMALL INTESTINE: ISOLATION AND PARTIAL CHARACTERIZATION [Abstract]. (Eng.) Das, B. C.; Shaw, S. A. (Veterans Admin. Hosp., Charleston, SC). *Gastroenterology* 72(5, Part 2):1043; 1977.

5274 HUMAN JEJUNAL BRUSH BORDER FOLATE CONJUGASE [Abstract]. (Eng.) Reisenauer, A. M.; Krumdieck, C. L.; Halsted, C. H. (Dept. Internal Medicine, Univ. California, Davis, CA 95616). *Gastroenterology* 72(5, Part 2):1118; 1977.

5275 REGULATION OF LECITHIN SYNTHESIS IN INTESTINE [Abstract]. (Eng.) Mansbach, C. M., II (Veterans Admin. Hosp., Durham, NC). *Gastroenterology* 72(5, Part 2):1098; 1977.

5276 COLONIC CHANGES PRODUCED BY TRANSFERRING COLON SENSITIZED LYMPHOCYTES INTO NORMAL GUINEA PIGS [Abstract]. (Eng.) Rogers, S. J.; Rabin, B. S. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Gastroenterology* 72(5, Part 2): 1121; 1977.

5277 FLOW RATE AND COMPOSITION OF INTESTINAL LYMPH IN CONSCIOUS RATS AFTER INTRADUODENAL APPLICATION OF WATER [Abstract]. (Eng.) Gartemann, H.; Dennhardt, R.; Reschke, W.; Haberich, F. J. (Inst. fur Angewandte Physiologie, 3550 Marburg/Lahn, Lahnberge, W. Germany). *Pfluegers Arch.* 368(Suppl.):R11; 1977.

5278 THE SMALL INTESTINE IN LEUKEMIC MICE AND THE EFFECT OF METHOTREXATE [Abstract]. (Eng.) Branski, D.; Lebenthal, E.; Hatch, T. F.; Krasner, J.; Fisher, J. E.; Freeman, A. I. (State Univ. New York, Buffalo, NY). *Gastroenterology* 72(5, Part 2):1169; 1977.

5279 EFFECT OF PENTAGASTRIN ON THE SMALL INTESTINE AFTER RESECTION [Abstract]. (Eng.) Morin, C. L.; Ling, V.; Bourassa, D. (Hopital Ste-Justine, Montreal, Canada). *Gastroenterology* 72(5, Part 2):1105; 1977.

5280 A STUDY OF DIGESTION AND ABSORPTION OF PROTEIN MEAL AND TRYPSIN IN HUMAN DISTAL ILEUM [Abstract]. (Eng.) Chung, Y. C.; Kim, Y. S.; Shadchehr, A.; Garrido, A.; MacGregor, I. L.; Sleisenger, M. H. (Veterans Admin. Hosp., San Francisco, CA). *Gastroenterology* 72(5, Part 2):1038; 1977.

5281 PEPTIDE HYDROLASES OF THE BRUSH BORDER OF HUMAN INTESTINAL MUCOSA [Abstract]. (Eng.) Yeh, R.; Huang, T. I.; Heizer, W. D. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC). *Clin. Res.* 25(3):321A; 1977.

5282 EFFECT OF BILE DEPRIVATION ON TRYPSIN, CHYMOTRYPSIN, AND LIPASE ACTIVITIES IN RAT INTESTINAL CONTENTS [Abstract]. (Eng.) Green, G.; Nasset, E. S. (Children's Hosp. Medical Center, Oakland, CA). *Gastroenterology* 72(5, Part 2):1065; 1977.

5283 SIMULTANEOUS BIOASSAY AND RADIOIMMUNOASSAY OF SECRETIN IN DOGS [Abstract]. (Eng.) Fender, H. R.; Curtis, P. J.; Rayford, P. L.; Thompson, J. C. (Univ. Texas Medical Branch, Galveston, TX). *Gastroenterology* 72(5, Part 2):1058; 1977.

5284 VASOACTIVE INTESTINAL PEPTIDE: THE FOURTH PHYSIOLOGICAL GUT HORMONE [Abstract]? (Eng.) Ebeid, A. M.; Murray, P.; Fischer, J. E. (Massachusetts General Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1055; 1977.

5285 SECRETION INDUCED BY VASOACTIVE INTESTINAL POLYPEPTIDE (VIP) AND CHOLERA TOXIN (CT) IN LOOPS OF DOG JEJUNUM IN VIVO [Abstract]. (Eng.) Barkley, R. M.; Krejs, G. J.; Read, N. W.; Fordtran, J. S. (Univ. Texas Health Science Center, Dallas, TX). *Gastroenterology* 72(5, Part 2):1027; 1977.

5286 PROPRANOLOL INHIBITION OF CHOLERA TOXIN-INDUCED INTESTINAL SECRETION IN THE RAT [Abstract]. (Eng.) Donowitz, M.; Charney, A. N. (Walter Reed Army Inst. Res., Washington, DC). *Gastroenterology* 72(5, Part 2):1050; 1977.

5287 SPECIFICITY OF THE SUCKLING MOUSE ASSAY (SMA) FOR HEAT STABLE E. coli ENTEROTOXIN (ST) AND MODE OF ACTION OF THE TOXIN [Abstract]. (Eng.) Giannella, R. A. (Veterans Admin. Hosp., Lexington, KY). *Gastroenterology* 72(5, Part 2):1062; 1977.

5288 ROLE OF THE TRYPTOPHAN RESIDUE IN PANCREOZYMIN [Abstract]. (Eng.) de Pont, J. J. H. H. M.; Rajh, B.; Smyth, M. J.; Tesser, G. I.

(Dept. Biochemistry, Univ. Nijmegen, Nijmegen, Netherlands). *Ir. J. Med. Sci.* 146(Suppl. 1):15-16; 1977.

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5290 SEPARATION AND CHARACTERISATION OF THE ORGANELLES IN PERORAL JEJUNAL BIOPSIES FROM THE DOG [Abstract]. (Eng.) Batt, R. M.; Bush, B. M.; Peters, T. J. (Royal Postgraduate Medical Sch., London, England). *Gut* 18(11):A960; 1977.

5291 CHALLENGE OF DOGS WITH LIVER ENTEROTOXIGENIC Escherichia coli AND EFFECTS OF REPEATED CHALLENGES ON FLUID SECRETION IN JEJUNAL THIRY VELLA LOOPS. (Eng.) Sack, R. B.; Johnson, J.; Pierce, N. F.; *et al.* (Baltimore City Hosp., Baltimore, MD). *J. Infect. Dis.* 134(1):15-24; 1976.

5292 EFFECTS OF INTRALUMINAL OSMOLARITY ON THE CELL PROLIFERATION IN THE SMALL INTESTINE [Abstract]. (Eng.) Skagen, D. W. (Haukeland Sykehus, Bergen, Norway). *Scand. J. Gastroenterol.* 12(Suppl. 45):99; 1977.

5293 ACTION OF PREDNISOLONE ON THE SMALL BOWEL MUCOSA [Abstract]. (Eng.) Al-Dewachi, H.; Wright, N. A.; Appleton, D. R.; Watson, A. J. (Dept. Pathology, Univ. Newcastle upon Tyne, Newcastle upon Tyne, England). *Gut* 18(11):A967-A968; 1977.

5294 EFFECT OF INTRALUMINAL LIPID ON SMALL BOWEL ADAPTATION AFTER RESECTION [Abstract]. (Eng.) Morin, C. L.; Ling, V.; Bourassa, D. (Hopital Sainte-Justine, Montreal, Quebec, Canada). *Clin. Res.* 25(5):688A; 1977.

See also, 5072, 5073, 5080, 5085, 5089, 5091, 5094, 5099, 5118, 5128, 5151, 5162, 5224, 5239, 5296, 5299, 5301, 5321, 5323, 5326, 5481, 5509, 5560, 5583, 5779.

GENERAL

5295 HEMORRHAGIC NECROSIS OF THE INTESTINAL MUCOSA ASSOCIATED WITH DISSEMINATED INTRAVASCULAR COAGULATION. (Eng.) Kondo, M.; Yoshikawa, T.; Takemura, S.; Yokoe, N.; Kawai, K.; Masuda, M. (Kyoto Prefectural Univ. Medicine, Kawaramachi-Hirokoji, Kamikyo-ku, Kyoto 602, Japan). *Digestion* 17(1):38-45; 1978.

To study the pathogenesis of intestinal hemorrhagic necrosis that is associated with disseminated intravascular coagulation (DIC), DIC was experimentally induced by the i.v. injection of *Escherichia coli* endotoxin (6-15 mg/kg) in dogs. This injection caused severe hemorrhagic necrosis of the intestinal mucosa. Microscopy showed tortuous thrombus formation in the microcirculation of the villi. Ligation of the pancreatic and bile ducts protected only the duodenum from hemorrhagic necrosis, while local pretreatment of the intestinal mucosa by Trasylol (25,000 U) or tranexamic acid (10% solution) reduced the degree of hemorrhagic necrosis. Among five rats that received tranexamic acid (400 mg/kg, i.p., plus 1% in the drinking water) followed by endotoxin (5 mg/kg, i.v.), hemorrhagic necrosis of the small intestine was observed in four, compared to only one of five rats in the saline-treated control group. When five rats receiving endotoxin (20 mg/kg, i.v.) alone were compared with five rats receiving both endotoxin and heparin (1,000 U/kg, i.v.), the heparin-treated group was seen to have less hemorrhagic necrosis than the other group, indicating the substantial role of DIC in this intestinal lesion. It is concluded that intravascular coagulation in the microcirculation of the intestinal mucosa, as well as pancreatic proteases, play a role in the pathogenesis of hemorrhagic necrosis in the intestine associated with DIC.

5296 LOCAL (IMMUNOGLOBULIN A) IMMUNE RESPONSE BY THE INTESTINE TO CHOLERA TOXIN AND ITS PARTIAL SUPPRESSION WITH COMBINED SYSTEMIC AND INTRA-INTESTINAL IMMUNIZATION. (Eng.) Yardley, J. H.; Keren, D. F.; Hamilton, S. R.; Brown, G. D. (Walter Reed Army Inst. Res., Washington, DC 20012). *Infect. Immun.* 19(2):589-597; 1978.

The local and systemic immune response to purified cholera toxin (CT) were studied in chronically isolated Thiry-Vella (T-V) ileal loops in rabbits. Immunization consisted of intraloop (i.l.), s.c., or combined i.l. and s.c. inoculation of CT. Fluid from the loops and sera were tested for neutralization of CT by the blueing test and for relative content of isotype-specific (IgA and IgG) anti-CT. To demonstrate protection against CT, fluid production by the chronic T-V loops was measured after challenge with CT; an "acute" loop prepared from adjacent intestine at the time of challenge was also tested in some animals. The highest neutralizing titers in loop fluids were found in animals receiving i.l. or i.l. and s.c. inoculations, whereas titers in sera were highest in rabbits receiving s.c. or i.l. and s.c. inoculations. IgA anti-CT in fluids became greatest after i.l. inoculation alone and was lowest in s.c. animals. Combined s.c. and i.l. immunization was accompanied by reduced content of IgA anti-CT in fluids as compared with that obtained with i.l. inoculation alone. This finding strongly suggests a suppressive effect on local immunization by s.c. inoculation. While this suppression may have been due to a direct (toxigenic) effect of CT on lymphocytes, an immunogenic mechanism, probably mediated through suppressor T cells, is favored. Little IgG anti-CT was detected in any loop fluids, but high levels were found in sera after two s.c. inoculations or four i.l. inoculations. Neutralization titers for the fluid specimens showed much better correlation with IgA anti-CT values than with IgG anti-CT values. The chronic and acute T-V loops showed protection against fluid production after exposure to CT in systemically and locally immunized animals. However, IgG anti-CT usually appeared in both loops; leakage of serum antibodies because of surgical manipulation was felt, therefore, to invalidate these protection results as a demonstration of local immunity. In challenge studies in undisturbed chronic loops, only local immunization alone was found to result in definite protection. These data do not permit a clear choice between a toxigenic or an immunogenic mechanism for suppression of IgA anti-CT in loops, but the immunogenic mechanism is favored. Additionally, it is possible that suppression of local immunity (and hence suboptimal protection) may occur when combined parenteral and p.o. vaccination are used in humans.

5297 INVAGINATED ESOPHAGOGASTRIC ANASTOMOSIS IN RESECTION OF THE CARDIA: AN EXPERIMENTAL STUDY. (Rus.) Morkhov, Iu. K.; Narodnitskaia, N. A.; Rottenberg, V. I. (Inst. Experimental and Clinical Oncology, USSR Acad. Medical Sciences, Moscow, USSR). *Grudn. Khir.* (4):78-82; 1977.

5298 TOTAL ESOPHAGEAL GRAFT USING JEJUNAL LOOP AND VASCULAR MICROANASTOMOSIS AT THE NECK: AN EXPERIMENTAL STUDY. (Fre.) Germain, M.; Patricio, J.; Gremillet, C.; Delavierre, Ph.; Dehoux, Ph.; Voudron, J.; Loisance, D. Y. (Hopital de Vaugirard, C.H.U. Necker, Enfants Malades, 389, rue de Vaugirard, 75015 Paris, France). *Chirurgie* 103(4):264-267; 1977.

5299 EVOLUTION OF INTESTINAL AND SERUM IMMUNOGLOBULINS OF THE MOUSE FOLLOWING ORAL VACCINATION. (Fre.) Ivanoff, B.; Laval, F.; Creach, O.; Fontanges, R. (Centre de Recherche, Service de Sante des Armees, 108, boulevard Pinel, 69272 Lyon Cedex 1, France). *C. R. Soc. Biol. (Paris)* 171 (2):380-385; 1977.

5300 THE EFFECT OF QUERCITRIN ON THE STRUCTURAL CHANGES IN THE LARGE AND SMALL INTESTINES IN EXPERIMENTAL ENTEROCOLITIS. (Rus.) Galsanov, Sh. B.; Turova, A. D.; Klimenko, E. D. (All-Union Scientific Res. Inst. Medicinal Drugs, Moscow, USSR). *Biull. Eksp. Biol. Med.* 81(5):623-625; 1976.

5301 INFLUENCE OF DIET ON THE NUMBER OF AMYLOLYTIC, PROTEOLYTIC, AND LIPOLYTIC BACTERIA IN THE GASTROINTESTINAL TRACT OF THE RAT. (Ger.) Juhr, N. C.; Haas, A. (Fachrichtung Versuchstierkunde und Versuchstierkrankheiten, Freie Universitat Berlin [West], Tietzenweg 85, Berlin 45, W. Germany). *Z. Versuchstierkd.* 19(1/2):71-79; 1977.

5302 EXPERIMENTAL STUDY OF THE ETIOLOGY AND PATHOGENESIS OF NONSPECIFIC ULCERATIVE COLITIS. (Bul.) Dzhadzhova-Boneva, M. (Inst. Gastroenterology, Acad. Medicine, Sofia, Bulgaria). *Dokl. Bulg. Akad. Nauk* 30(9):1363-1366; 1977.

5303 INFLUENCE OF ORALLY ADMINISTERED PANCREATIC EXTRACT ON Vibrio cholerae INFECTION DURING PROTEIN-FREE DIET. (Ger.) Gyr, K.; Felsenfeld, O. (Kantonsspital, CH-4004 Basel, Switzerland). *Schweiz. Med. Wochenschr.* 107(15):545-546; 1977.

5304 A MODIFIED THOMAS CANNULA TO CREATE A CHRONIC PANCREATIC FISTULA IN MINIPIGS. (Ger.) Lehmann, L.; Klein, H. D. (Chirurgische Universitatsklinik, Josef-Schneider-Strasse 2, D-8700 Wurzburg, W. Germany). *Res. Exp. Med. (Berl.)* 171(2):173-175; 1977.

5305 COMPARATIVE ASSESSMENT OF RHEOHEPATOGRAM OF HEALTHY CHILDREN, ADOLESCENTS, AND ADULTS DURING EXPIRATION AND INSPIRATION. (Rus.) Sarkisian, N. M.; Andreeva, N. Ia. (4th Principal Administration, USSR Ministry Public Health, Moscow, USSR). *Ter. Arkh.* 49(6):93-97; 1977.

5306 RHEOGRAPHY OF THE STOMACH. (Rus.) Mazhbich, B. I.; Beloborodova, E. I. (Inst. Pathology, Siberian Branch, USSR Acad. Medical Sciences, Novosibirsk, USSR). *Biull. Eksp. Biol. Med.* 84(7):118-121; 1977.

5307 SCHISTOSOMICIDAL COMPOUNDS. PART I. N^4-(N-ACYL-N-ALKYLGLYCYL)-SULFANYLAMIDE. (Ger.) Horstmann, H.; Schutz, S.; Behnisch, R.; Gonnert, R.; Andrews, P. (Chemisch Wissenschaftliches Laboratorium Pharma der Bayer AG, Postfach 10 17 09, D-5600 Wuppertal 1, W. Germany). *Eur. J. Med. Chem.* 12(4):387-392; 1977.

5308 GASTRIC ULCERATION IN THE RAT: A NEW EXPERIMENTAL MODEL AND PROTECTION BY MEANS OF A TRITERPEN HEALING AGENT. (Fre.) Lefournier, C.; Poizot, A.; de Saint-Maur, P. (Hopital Saint-Antoine, 75012 Paris, France). *C. R. Acad. Sci. [D] (Paris)* 284(19):1931-1934; 1977.

5309 PATHOGENESIS OF HEPATOCEREBRAL INSUFFICIENCY. (Rus.) Gallperin, E. I.; Baranova, F. S.; Gabrielian, N. I.; Demidenko, G. I. (Inst. Organ and Tissue Transplantation, USSR Ministry Health, Moscow, USSR). *Eksp. Khir. Anesteziol.* (5):50-53; 1976.

5310 PRESERVATION OF THE LIVER BY ARTIFICIAL CIRCULATION IN THE CADAVER. (Rus.) Margulis, M. S.; Sorokin, Iu. A.; Rozental, R. L.; Markow, Iu. G.; Sondore, A. A.; Krivulis, D. B.; Andreiman, L. A. (Lab. Experimental Surgery, Riga Medical Inst., Riga, USSR). *Eksp. Khir. Anesteziol.* (5):53-57; 1976.

5311 CHANGES OF WAKEFULNESS IN THE RAT WITH PORTOCAVAL SHUNT: A QUANTITATIVE EVALUATION OF EXPERIMENTAL HEPATIC ENCEPHALOPATHY [Abstract]. (Eng.) Beaubernard, C.; Salomon, F.; Grange, D.; Bismuth, H. (Groupe Hospitalier Paul Brousse, 14, Avenue P.-V. Couturier, 94800 Villejuif, France). *Eur. Surg. Res.* 9(Suppl. 1):164; 1977.

5312 EFFECT OF AFFERENT ABDOMINAL VAGAL STIMULATION ON CIRCULATION AND RESPIRATION IN THE GUINEA PIG. (Ger.) Paschen, U.; Schumpelick, V. (Chirurgische Universitatsklinik Hamburg, Martinistrasse 52, D-2000 Hamburg 20, W. Germany). *Z. Gastroenterol.* 15(4):254-263; 1977.

5313 THE IMMUNE RESPONSE AND ACQUIRED RESISTANCE TO Ascaris suum INFECTION IN MICE WITH AN X-LINKED B LYMPHOCYTE DEFECT. (Eng.) Brown, A. R.; Crandall, C. A.; Crandall, R. B. (Coll. Medicine, Univ. Florida, Gainesville, FL 32610). *J. Parasitol.* 63(5):950-952; 1977.

5314 EFFICACY OF A NEW CESTOCIDE, PRAZIQUANTEL, AGAINST LARVAL Mesocestoides corti AND Taenia crassiceps IN MICE. (Eng.) Novak, M. (Dept. Biology, Univ. Winnipeg, Winnipeg, Manitoba R3B 2E9, Canada). *J. Parasitol.* 63(5):949-950; 1977.

5315 OOGRAMS OF Schistosomatium douthitti IN MICE CONCOMITANTLY INFECTED WITH Fasciola hepatica. (Eng.) Maldonado-Moll, J. F. (Sch. Medicine, Rio Piedras, PR 00936). *J. Parasitol.* 63(5):946-947; 1977.

5316 EFFECT OF PREGNANCY ON THE NUMBER OF WORMS DEVELOPED IN MICE INFECTED WITH Schistosoma mansoni. (Eng.) Preston, A. M.; El-Khatib, S. M. (Univ. Puerto Rico Medical Sciences Campus, G.P.O. Box 5067, San Juan, PR 00936). *J. Parasitol.* 63(5):943-945; 1977.

5317 AMEBIC GRANULOMA--AN EXPERIMENTAL STUDY. (Eng.) Kaushik, S. P.; Ravindra, N.; Vinayak, V. K.; Chakravarty, R. N. (Postgraduate Inst. Medical Education and Res., Chandigarh 160011, India). *Am. J. Gastroenterol.* 68(1):64-70; 1977.

5318 ONTOGENY OF PEPTIDE-PRODUCING NERVES AND ENDOCRINE CELLS OF THE GASTRO-DUODENO-PANCREATIC REGION. (Eng.) Larsson, L. I. (Inst. Medical Biochemistry, Univ. Aarhus, DK-8000 Aarhus C, Denmark). *Histochemistry* 54(2):133-142; 1977.

5319 TIME-DEPENDENT GASTROINTESTINAL ADAPTATION OF HUMAN SUBJECTS AND NONHUMAN PRIMATES TO LIQUID DEFINED FORMULA DIETS. (Eng.) Spiller, G. A.; Beigler, M. A. (Inst. Agriscience and Nutrition, Syntex Res., Palo Alto, CA 94304). *Z. Ernaehrungswiss.* 20(Suppl.):48-57; 1977.

5320 THE EFFECT OF ACUTE AND SUBACUTE AMMONIA INTOXICATION ON REGIONAL CEREBRAL ACETYLCHOLINE LEVELS IN RATS [Abstract]. (Eng.) Parker, T. H.; Roberts, R. K.; Vorhees, C. V.; Schmidt, D. E.; Schenker, S. (Vanderbilt Univ. Sch. Medicine, Nashville, TN). *Gastroenterology* 73(5):1238; 1977.

5321 CHOLESTEROL LOWERING MECHANISM DUE TO INTESTINAL BYPASS IN RAT [Abstract]. (Eng.) David, J. S. K.; Reichle, F. A.; Golsorkhi, M. (Temple Univ. Health Sciences Center, Philadelphia, PA 19140). *Gastroenterology* 73(5):1242; 1977.

5322 BILIRUBIN ISOMERS AND PHOTOTHERAPY [Abstract]. (Eng.) Roos, W. T.; Wieger, H. H.; Windler, S. C. H.; Jones, C. O. (Dept. Pediatric Oncology, Univ. California, San Francisco, CA 94143). *Gastroenterology* 73(5):1243; 1977.

5323 TROPHIC AND CO-CARCINOGENIC ACTIONS OF PANCREATICOBILIARY SECRETIONS [Abstract]. (Eng.) Williamson, R. C. N.; Bauer, F. L. R.; Ross, J. S.; Malt, R. A. (Dept. Surgery, Univ. Bristol, Bristol, England). *Ir. J. Med. Sci.* 146(Suppl. 1):8; 1977.

5324 IMMUNOTHERAPY OF CHEMICALLY INDUCED RAT COLORECTAL CARCINOMA [Abstract]. (Eng.) Martin, M. S.; Martin, F. (Laboratoire d'Immunologie, CNRS ERA 628, Dijon, France). *Digestion* 16(1/2):214-215; 1977.

5325 CERVICAL ESOPHAGOSTOMY IN DOGS: ENDOSCOPIC, RADIOGRAPHIC, AND HISTOPATHOLOGIC EVALUATION OF ESOPHAGITIS INDUCED BY FEEDING TUBES.

(Eng.) Balkany, T. J.; Baker, B. B.; Bloustein, P. A.; Jafek, B. W. (Univ. Colorado Medical Center. Denver, CO 80220). *Ann. Otol. Rhinol. Laryngol.* 86(5, Part 1):588-593; 1977.

5326 HYPOXIC PROTECTION OF CANINE JEJUNUM FROM RADIATION INJURY. (Eng.) Peterson, C. E.; Eddy, H. A.; Patterson, W. B. (Univ. Rochester Sch. Medicine and Dentistry, Rochester, NY). *Surg. Forum* 28:426-428; 1977.

See also, 5071, 5133, 5144, 5228, 5276, 5514, 5668, 5784, 5798.

DIAGNOSTIC PROCEDURES

5327 SIGNIFICANCE OF SERUM LEVEL OF 25-HYDROXYCHOLECALCIFEROL IN GASTROINTESTINAL DISEASE. (Eng.) Schoen, M. S.; Lindenbaum, J.; Roginsky, M. S.; Holt, P. R. (Coll. Physicians and Surgeons, Columbia Univ., New York, NY). *Am. J. Dig. Dis.* 23(2):137-142; 1978.

The serum 25-hydroxycholecalciferol (25-OHCC) concentration was measured in 19 patients with steatorrhea, 37 with malabsorption, 3 with cholestasis, 13 with cirrhosis, 12 patients who had undergone jejunoileal bypass, 29 postgastrectomy patients, 19 patients with functional bowel disease, and 19 healthy controls to evaluate the usefulness of this determination in the management of gastrointestinal disorders. Patients with functional bowel disease had lower serum mean 25-OHCC levels than did the normal subjects. The results were divided into normal (>21 ng/ml), low normal (12-21 ng/ml), and low levels (<12 ng/ml). Two-thirds of the patients with malabsorption had low serum 25-OHCC. Most patients following jejunoileal bypass surgery for morbid obesity had low levels, despite supplemental p.o. calciferol therapy; only 4 of the 12 had levels over 12 ng/ml. In patients with chronic liver disease, cholestasis more than parenchymal cell disease appeared responsible for low serum 25-OHCC levels; the levels were depressed in all three patients with cholestasis but in only 2 of the 13 with cirrhosis. Measurement of serum 25-OHCC may be an ancillary screening test for fat malabsorption and in patients with intraluminal bile salt deficiency. Furthermore, repeated measurements may be useful in monitoring therapy with vitamin D products in patients with chronic malabsorption and cholestasis.

5328 DOUBLE-BLIND RADIOGRAPHIC STUDY OF DOSE RESPONSE TO INTRAVENOUS GLUCAGON FOR HYPOTONIC DUODENOGRAPHY. (Eng.) Miller, R. E.; Chernish, S. M.; Brunelle, R. L.; Rosenak, B. D. (Indiana Sch. Medicine, Indianapolis, IN 46202). *Radiology* 127(1):55-59; 1978.

A study was carried out in 15 normal volunteers to determine whether small doses of glucagon given i.v. would induce sufficient hypotonicity of the upper gastrointestinal tract to provide a reliable demonstration of gut anatomy during radiographic studies. The subjects received placebo and 0.25 mg, 0.5 mg, 1 mg, and 2 mg of glucagon i.v., double-blind, and crossover. The onset of drug effect occurred in approximately 45 sec, regardless of the dose of glucagon given. There was a significant ($p<0.01$) decrease in gastrointestinal tonicity with all doses. The larger the dose, the greater the duration of drug action. Satisfactory stomach, duodenal, and small bowel hypotonicity for radiography are obtained with few side-effects with 0.25 to 0.5 mg of glucagon given i.v.

5329 AN IN-VITRO IMMUNOLOGICAL ASSAY FOR DIAGNOSIS OF COELIAC DISEASE. (Eng.) Ashkenazi, A.; Handzel, Z. T.; Idar, D.; Ofarim, M.; Levin, S. (Kaplan Hosp., P.O. Box 1 Rehovot, Israel). *Lancet* 1(8063):627-629; 1978.

Production of leukocyte-migration-inhibition factor (LIF) by peripheral blood lymphocytes in response to challenge with gluten fractions was studied as a diagnostic test for celiac disease in 55 patients with celiac disease and in 32 controls. Ninety-six percent of the patients with celiac disease demonstrated significant LIF reaction in response to gluten fractions irrespective of their dietary status. Only two controls had a positive reaction. This was in response to the B2 or B3 fraction, but never to both. The agarose microdroplet method of LIF assay is reliable and technically simple enough for use in most clinical laboratories. The assay of LIF production by peripheral blood lymphocytes in response to gluten fractions would be a useful adjunct in the diagnosis of gluten-sensitive enteropathy.

5330 COMPUTED TOMOGRAPHY IN PANCREATIC DISEASE. (Eng.) Fawcitt, R. A.; Forbes, W. S. C.; Isherwood, I.; Braganza, J. M.; Howat, H. T. (Dept. Diagnostic Radiology, Univ. Manchester, Manchester, England). *Br. J. Radiol.* 51(601):1-4; 1978.

As a prerequisite to a future study of computed tomography (CT) in the management of pancreatic disease, CT of the pancreas was evaluated in 50 patients with established exocrine pancreatic disease and 20 patients without pancreatic disease. Increase in size, irregularity in outline, and heterogeneity of composition of the pancreas implied disease but were in no way specific to any particular disease entity. In acute pancreatitis, following complete resolution, the pancreas appeared normal, whereas incomplete resolution was associated with nonspecific swelling and heterogeneity of density. The extent and location of pseudocysts could be accurately delineated. In chronic pancreatitis, duct calculi, duct dilatation, and large intrapancreatic cysts aided the differentiation between focal enlargement due to chronic pancreatitis and expansion due to cancer. Hepatic metastases and abnormalities of the biliary system seen in association with cancer further aided this differentiation.

5331 AN EVALUATION OF ANGIOGRAPHY, ^{75}Se-METHIONINE SCINTIGRAPHY AND THE LUNDH TEST IN THE DIAGNOSIS OF PANCREATIC DISEASE. (Eng.) Kugelberg, C.; Ihse, I.; Cederquist, E.; Larsson, I.; Tylen, U. (Dept. Surgery, Univ. Lund, Lund, Sweden). *Acta Chir. Scand.* 143(6):353-358; 1977.

To determine the most satisfactory procedure for clinical use in the diagnosis of pancreatic disease, 74 patients subjected to selective angiography, pancreatic function test (Lundh test), and scintigraphy were studied retrospectively. The patients were divided into four diagnostic subgroups, three of which represented defined pancreatic disease, the fourth serving as a control group, since such disease was excluded. The primary diagnostic results were compared. After a stipulated minimum of 6 months, the angiographic films and scintigraphic recordings were reappraised in a randomized manner without access to clinical data. The evaluations thus achieved were compared to those delivered primarily. The Lundh test and pancreatic scintigraphy were found to have a high level of diagnostic reliability and consistency; when normal, they practically ruled out pancreatic disease. Angiography was useful only if one or both of the above mentioned screening methods yielded pathologic results, supported by clinical evidence. The principal aims of selective angiography in suspected pancreatic disease are to map vascular anatomy, to differentiate nonneoplastic disease from cancer, and to assist estimation of operability. The results indicate that the diagnostic accuracy of angiography, more than that of scintigraphy, is dependent on the experience of the examiner.

5332 PLASMA CYCLIC AMP LEVELS DURING A SECRETIN-CAERULEIN PANCREATIC FUNCTION TEST IN LIVER AND PANCREATIC DISEASE. (Eng.) Adler, M.; Robberecht, P.; Poitevin, M. G.; Christophe, J. (Free Univ. Brussels Medical Sch., Boulevard de Waterloo 115, B-1000 Brussels, Belgium). *Gut* 19(3): 214-219; 1978.

The initial purpose of this study was to explore the possible usefulness of plasma cyclic AMP (cAMP) determinations during secretin and cerulein infusions as a further pancreas function test. It became evident, however, that the data obtained were more useful in evaluating hepatic rather than pancreatic impairments. Plasma cAMP levels were determined during a 40-min secretin infusion (1 clinical [C] U/kg/hr) followed by a 40-min combined secretin (1 CU/kg/hr)-cerulein (75 ng/kg/hr) infusion. In nine healthy subjects, both secretin alone and secretin in combination with cerulein did not affect plasma cAMP levels. The same result was observed in six patients with chronic pancreatitis. By contrast, in patients with liver disease (9 cases) or extrahepatic cholestasis (6 cases), secretin elicited large increases in plasma cAMP concentration; the mean values were seven and four times higher than before the infusion, resp. On the other hand, increases in plasma cAMP 10 min after a bolus injection of glucagon (1 mg) were four times lower in the liver disease group as compared to the controls. The results suggest that the liver plays a major role in the degradation of plasma cAMP produced by target tissues responding to secretin and in the release of cAMP under the influence of glucagon. Liver disease reduces the capacity of the liver to clear cAMP from the blood. The pancreas does not contribute significantly to the level of cAMP in the blood.

5333 ALPHA-FETOPROTEIN IN LIVER DISEASE. (Eng.) Alexander, M. G.; Purves, L. R.; Kirsch, R. E.; Bass, N. M.; Gitlin, N.; Terblanche, J.; *et al.* (Groote Schuur Hosp., Cape Town, South Africa). *S. Afr. Med. J.* 53(12):433-436; 1978.

The serum concentration of alpha-fetoprotein (AFP) was measured by radioimmunoassay in 98 patients with liver diseases including hepatoma (35), chronic active hepatitis (12), alcoholic cirrhosis (43), and acute virus B hepatitis (8). Raised AFP levels (>30 ng/ml) were found in 87% of patients with acute viral hepatitis, in 82% of patients with primary liver cell carcinoma, in 58% with chronic active hepatitis, and in 14% of patients with alcoholic cirrhosis. However, levels above 1,000 ng/ml were found only in patients with hepatoma and in acute viral hepatitis. The results suggest that AFP synthesis may occur as a result of regenerative activity.

5334 CLINICAL VALUE OF THE BILE ACID BREATH TEST: EVALUATION OF THE MAYO CLINIC EXPERIENCE. (Eng.) Lauterburg, B. H.; Newcomer, A. D.; Hofmann, A. F. (Div. Gastroenterology, Univ. California at San Diego, San Diego, CA). *Mayo Clin. Proc.* 53(4):227-233; 1978.

To assess the clinical value of the bile acid breath test, experience with 228 tests in 219 patients was analyzed retrospectively. In patients with suspected bacterial overgrowth, the result of the bile acid breath test was compared with that of small bowel aspirate cultures, and the test was found to have a sensitivity of 0.70 and a specificity of 0.90 (1.0 was highest possible value). The bile acid breath test failed to demonstrate the presence of bacterial overgrowth in one-third of the patients with a positive small bowel culture. Analysis of the data showed that, compared with a routine evaluation without a small bowel culture, the availability of breath test results will double the probability with which the clinician can be certain about the presence or absence of bacterial overgrowth. The test result appeared to influence the diagnosis in 83% and the management in 74% of the 163 patients in whom it was performed because of suspected bacterial overgrowth. In patients with suspected malabsorption of bile acids, on the other hand, the test that was performed without determination of fecal bile acid excretion appeared to be rather insensitive, and only rarely was information gained that was not already known from a routine workup of the patient.

5335 ASSESSMENT OF THE (^{14}C) AMINOPYRINE BREATH TEST IN LIVER DISEASE. (Eng.) Galizzi, J.; Long, R. G.; Billing, B. H.; Sherlock, S. (Faculdade de Medicina, Belo Horizonte, M.G., Brazil). *Gut* 19(1):40-45; 1978.

Different methods of performing the ^{14}C-aminopyrine breath test were assessed in 27 patients with chronic active hepatitis (with and without cirrhosis), 21 with primary biliary cirrhosis, 11 with alcoholic cirrhosis, 7 with alcoholic hepatitis, 8 with alcoholic fatty liver, 3 with acute hepatitis, 4 with hepatic malignancy, 3 with neoplastic bile duct obstruction, 3 with extrahepatic bile duct obstruction, and 15 controls. A tracer dose of 2 μCi without a loading dose and with a single breath collection at 2 hr was the method selected, since it gave the best discrimination between patients with hepatocellular diseases and normal subjects (5.2 ± 0.2%). Reduced values occurred in patients with chronic active hepatitis (1.5 ± 0.2%, $p<0.001$), alcoholic cirrhosis (1.7 ± 0.4%, $p<0.001$), hepatitis (2.5 ± 0.3%), and late primary biliary cirrhosis, suggesting defective microsomal function with respect to demethylation. Normal results were common in early primary biliary cirrhosis. Two weeks of prednisolone therapy caused some improvement in the breath test in 9 of 10 patients with chronic active hepatitis. It is concluded that the ^{14}C-aminopyrine breath test is a simple test for detecting hepatocellular dysfunction, but has no obvious diagnostic advantage over the determination of serum aspartate transaminase and 2 hr postprandial bile acids.

5336 LIPOPROTEIN-X AND DIAGNOSIS OF CHOLESTASIS: COMPARISON WITH OTHER BIOCHEMICAL PARAMETERS AND LIVER BIOPSY.

(Eng.) Fellin, R.; Manzato, E.; Zotti, S.; Baggio, G.; Briani, G.; Rugge, M. (Univ. Hosp., Via Guistiniani 2, 35100 Padova, Italy). *Clin. Chim. Acta* 85(1):41-47; 1978.

To study the comparative diagnostic value of the lipoprotein X (LP-X) test in liver disease, the presence or absence of histological signs of cholestasis was compared with the levels of total bilirubin, alkaline phosphatase, gamma-glutamyl transpeptidase (γ-GT), ornithine carbamoyltransferase, and SGOT, and the LP-X test in 157 patients with different liver diseases. The LP-X test was positive in 93% of the 59 patients in whom histological evidence of cholestasis was observed and negative in 95% of the 98 patients in whom histological examination was negative. The LP-X test concurred more frequently with the histological picture than did total bilirubin (>1 mg/dl in 88%) or alkaline phosphatase (>4.1 IU/1 in 71%) activities. An increment in γ-GT levels was observed in 97% of the patients with a positive LP-X test. These data confirm that the LP-X test is more specific than the tests traditionally used to demonstrate or exclude cholestasis.

5337 VITAMIN B_6 AND ASPARTATE AMINOTRANSFERASE ACTIVITY IN CHRONIC LIVER DISEASE.

(Eng.) Rossouw, J. E.; Labadarios, D.; Davis, M.; Williams, R. (MRC Natl. Res. Inst. for Nutritional Diseases, Parowvallei, CP, South Africa). *S. Afr. Med. J.* 53 (12):436-438; 1978.

The effect of vitamin B_6 supplementation on serum aspartate aminotransferase (AST) activity was studied in patients with decompensated liver disease. Treatment of eight vitamin B_6-deficient cirrhotic patients with pyridoxine hydrochloride (50 mg i.v., b.i.d. for 1 week) increased their serum AST concentrations from 121 ± 18 to 136 ± 26 IU/1, while treatment of a second group of nine patients with the active coenzyme pyridoxal-5-phosphate (PLP) increased AST concentrations from 118 ± 17 to 146 ± 20 IU/1. Neither of these increases was statistically significant. Plasma PLP increased from 2.4 ± 0.7 to 18.5 ± 7.6 ng/ml after pyridoxine, and from 3.3 ± 0.7 to 27.0 ± 6.2 ng/ml after PLP supplementation. It is concluded that B_6 deficiency is unlikely to be an important determinant of serum AST concentrations in patients with chronic liver disease.

5338 COMPLICATIONS OF DIAGNOSTIC PARACENTESIS IN PATIENTS WITH LIVER DISEASE.

(Eng.) Mallory, A.; Schaefer, J. W. (Denver General Hosp., W. Eighth Ave. and Cherokee St., Denver, CO 80204). *JAMA* 239(7):628-630; 1978.

Experience with diagnostic abdominal paracentesis in 242 patients with liver disease or ascites is reviewed to determine its safety. There were seven major complications, including serious hemorrhage (4), perforation of bowel with generalized peritonitis (1), perforation of bowel with abdominal wall abscess (1), and a catheter fragment left in the abdominal wall or cavity (1). The results emphasize the potential dangers of this procedure in these patients and raise the possibility that complications may be more common than previously thought.

5339 IOGLYCAMIDE (BILIGRAM) STUDIES IN MAN--RELATION BETWEEN PLASMA CONCENTRATION AND BILIARY EXCRETION.

(Eng.) Bell, G. D.; Fayadh, M.; Frank, J.; McMullin, J.; Fry, I. K. (St. Bartholomew's Hosp., London, E.C.1, England). *Br. J. Radiol.* 51(602):111-115; 1978.

In view of the hazards associated with i.v. cholangiography, the lowest infusion rate of ioglycamide necessary to achieve optimal radiographic opacification of the bile duct was studied in 36 patients. Plasma ioglycamide concentration was linearly related to the rate of i.v. infusion over a dose range of 1 to 4 mg/kg/min. The relation between plasma and biliary concentration of ioglycamide was studied in 15 anicteric patients with a T-tube *in situ*. Peak biliary concentrations and excretory rates of ioglycamide were seen when the plasma concentration was greater than 1,500 μg/ml. The mean biliary transport maximum for ioglycamide in man was 31.6 mg/min (range 22.0-40.4). The results suggest that near optimal concentrations of iodine in the bile duct can be obtained during i.v. cholangiography if ioglycamide is infused for 1 hr at a rate of about 4 mg/kg/min.

5340 THE EARLY USE OF FINE-NEEDLE PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY IN AN APPROACH TO THE DIAGNOSIS OF JAUNDICE IN A SURGICAL UNIT.

(Eng.) Benjamin, I. S.; Allison, M. E. M.; Moule, B.; Blumgart, L. H. (Glasgow Royal Infirmary, Glasgow, Scotland). *Br. J. Surg.* 65(2):92-98; 1978.

The value and safety of fine-needle percutaneous transhepatic cholangiography (PTC) were investigated in 46 patients with jaundice or suspected biliary tract disease. The ductal system was successfully outlined in each of 20 patients with dilated intrahepatic ducts and in 19 of 26 patients with intrahepatic ducts of normal caliber. There were two episodes of septicemia after PTC, one of them fatal. Valuable accurate diagnostic information was obtained in all cases with biliary tract obstruction. Fine-needle PTC is an acceptably safe procedure and need not be followed by immediate laparotomy.

5341 EVALUATION OF ULTRASOUND IN THE DIAGNOSIS OF ACUTE AND CHRONIC BILIARY TRACT DISEASE. (Eng.) Thal, E. R.; Weigelt, J.; Landay, M.; Conrad, M. (Southwestern Medical Sch., 5323 Harry Hines Blvd., Dallas, TX 75235). *Arch. Surg.* 113(4):500-503; 1978.

The reliability of B-scale sonography was evaluated in 108 patients who underwent the procedure prior to operation. The sonogram was correct in 96 of the 108 patients. There were four false-negatives, one false-positive, and seven patients in whom the study was nondiagnostic. Stones were seen in 88 patients and confirmed in 87 patients, for an accuracy of 98.9%. Sonography is a simple, noninvasive procedure by which cholelithiasis can be accurately detected. Because of the high correlation between sonography and operative findings, the authors suggest that cholecystosonography be used as the initial screening study in patients suspected of having biliary tract disease.

5342 NEW CHOLANGIOGRAPHIC SIGN OF COMMON BILE DUCT OBSTRUCTION: INITIAL OPACIFICATION OF INTRAHEPATIC DUCTS. (Eng.) Black, E. B.; Ferrucci, J. T., Jr. (Massachusetts General Hosp., Boston, MA 02114). *Am. J. Roentgenol.* 130(1):61-65; 1978.

The dynamic patterns of biliary contrast flow during i.v. cholangiography are discussed, and a previously undescribed cholangiographic sign of common duct obstruction is described. This sign--initial visualization of proximal intrahepatic ducts--was observed in 26 patients with surgically proven obstructive disease of the distal common duct. In all cases, opacification of intrahepatic biliary radicles occurred on standard interval films prior to visualization of the extrahepatic common bile duct, the reverse of the normal sequence. The abnormal opacification pattern reflects stasis of bile flow in the presence of distal obstruction and seems analogous to the urographic finding of opacified intrarenal calyces as the initial manifestation of distal ureteral obstruction. Recognition of the alteration in the initial cholangiographic opacification sequence signals the need for delayed films to confirm the diagnosis of a distal choledochal obstruction.

5343 ENDOSCOPY IN PEDIATRIC PATIENTS WITH UPPER GASTROINTESTINAL BLEEDING. (Eng.) Akasaka, Y.; Misaki, F.; Miyaoka, T.; Nakajima, M.; Kawai, K. (Kyoto Prefectural Univ. Medicine, Kyoto, Japan). *Gastrointest. Endosc.* 23(4):199-200; 1977.

5344 UPPER GASTROINTESTINAL FIBEROPTIC ENDOSCOPY IN PEDIATRIC PATIENTS. (Eng.) Ament, M. E.; Christie, D. L. (Univ. California at Los Angeles Center Health Sciences, Los Angeles, CA 90024). *Gastroenterology* 72(6):1244-1248; 1977.

5345 COMPARISON OF DOUBLE-CONTRAST RADIOLOGY, STANDARD RADIOLOGY, ENDOSCOPY, ALSO OF HISTOLOGY AND CYTOLOGY IN THE DIAGNOSIS OF GASTRIC CANCER [Abstract]. (Eng.) MacKenzie, J. F.; Rogers, I. M.; Moule, B.; Young, J. A.; Hughes, H. E.; Lee, F. D.; *et al.* (Royal Infirmary, Glasgow, Scotland). *Gut* 18(5):A416; 1977.

5346 EXPLORING HIDDEN PASSAGES: NEW LOOK AT PANCREATIC AND BILIARY DUCTS. (Eng.) Levy, M. (St. Louis Park Medical Center, Minneapolis, MN). *Minn. Med.* 60(5):335-338; 1977.

5347 A SIMPLE DISCRIMINANT FUNCTION FOR HEPATIC DISEASE. (Eng.) Hamilton, M. (Dept. Psychiatry, Univ. Leeds, 15 Hyde Terrace, Leeds, LS2 9LT, England). *J. Clin. Pathol.* 30(5):454-459; 1977.

5348 A CRITICAL EVALUATION OF A PROCEDURE FOR MEASUREMENT OF SERUM BILE ACIDS BY RADIOIMMUNOASSAY. (Eng.) Mihas, A. A.; Spenney, J. G.; Hirschowitz, B. I.; Gibson, R. G. (Div. Gastroenterology, Univ. Alabama, Birmingham, AL 35294). *Clin. Chim. Acta* 76(3):389-397; 1977.

5349 A STUDY OF FILLING DEFECTS IN THE LIVER AND SPLEEN WITH MULTIPLE RADIONUCLIDES. (Eng.) Yeh, S. D. J.; Leeper, R. D.; Benua, R. S. (Memorial Sloan-Kettering Cancer Center, New York, NY). *Clin. Bull.* 7(1):3-12; 1977.

5350 LIVER SCAN IN THE DIAGNOSIS OF CONGENITAL DIAPHRAGMATIC HERNIA. (Eng.) Magilner, A. D. (Temple Univ. Sch. Medicine, Philadelphia, PA). *Pa. Med.* 80(4):58-59; 1977.

5351 DIAGNOSTIC SIGNIFICANCE OF THE PANCREATIC DISPLACEMENT WITH EXTRAPANCREATIC OVAL-SHAPED LOW ACTIVITY AREA ON SCINTIGRAM. (Eng.) Watanabe, K.; Nakayama, C.; Kamoi, I.; Matsuura, K. (Kyushu Univ. Sch. Medicine, Fukuoka 812, Japan). *Radiol. Clin. (Basel)* 46(2):130-139; 1977.

5352 AMYLASE THERMOLABILITY: ITS APPLICATION IN THE DIAGNOSIS OF ACUTE PANCREATITIS AND PANCREATIC PSEUDOCYSTS [Abstract]. (Eng.) Brodie, M. J.; Donaldson, L. A.; McIntosh, W.; Joffe, S. N. (Stobhill General Hosp., Glasgow, Scotland). *Gut* 18(5):A415-A416; 1977.

5353 HEMORRHAGES OF THE DIGESTIVE TRACT AND ARTERIOGRAPHY: PRESENT VALUE AND PER-

SPECTIVES. (Fre.) Rabin, A.; Drouillard, J.; Leveque, A. M.; Lotte, P.; Delorme, G. (Hopital Saint-Andre, 1 rue Jean Burguet, F 33075 Bordeaux Cedex, France). *Ann. Radiol.* 20(6):567-572; 1977.

5354 ENDOSCOPY OF THE UPPER GASTROINTESTINAL TRACT. (Ger.) Schwamberger, K. (Chirurgische Universitats-Klinik, Anichstrasse 35, A-6020 Innsbruck, Austria). *Therapiewoche* 28(1): 102-111, *passim;* 1978.

5355 ESOPHAGEAL ENDOSCOPY AND BIOPSY. (Ger.) Hauzeur, F. (Klinik fur Innere Medizin, Wilhelm-Pieck-Universitat, Ernst-Heydemann-Strasse, 25 Rostock, E. Germany). *Z. Gesamte Inn. Med.* 31 (21):869-872; 1976.

5356 VALUE OF X-RAY IN THE DIAGNOSIS OF DISTURBANCES OF INTESTINAL PASSAGE IN INFANCY. (Hun.) Koteles, G.; Szirmai, Z.; Ujvary, M. (Rontgenosztaly, Madarasz utcai Csecsemo es Gyermekkorhaz, Budapest, Hungary). *Orv. Hetil.* 117(50):3036-3039; 1976.

5357 DIAGNOSTIC RELEVANCE OF ENDOSCOPY OF THE DUODENAL BULB. (Ger.) Petzold, H.; Rogos, R.; Kuklinski, B. (Medizinische Klinik, Karl-Marx-Universitat, Johannisallee 32, 701 Leipzig, E. Germany). *Z. Gesamte Inn. Med.* 31(21):876-878; 1976.

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5362 CYTOLOGICAL DIAGNOSIS OF ALLERGIC GASTRITIS. (Rus.) Kachalai, D. P.; Larionov, V. G. (All-Union Scientific Res. Inst. Hygiene, Toxicology, Pesticides, Polymers and Plastic Materials, Kiev, USSR). *Vrach. Delo* (3):38-40; 1977.

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5365 SECRETIN-PANCREOZYMIN TEST IN ABSTINENT HEALTHY SUBJECTS. (Spa.) Pena Yanez, A.; Salmeron Mora, F. J.; Mora Lara, J.; Aguilar Martinez, J. L.; Rico Irles, J. (Hospital Clinico, Granada, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(6):679-700; 1977.

5366 ENDOSCOPIC RETROGRADE PANCREATICOGRAPHY AND PANCREATIC SONOGRAPHY: A CRITICAL COMPARISON. (Ger.) Holtz, U.; Falck, J.; Franken, F. H. (Krankenhaus St. Josef, Wuppertal-Elberfeld, W. Germany). *Z. Gastroenterol.* 15(10):600; 1977.

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5369 ESOPHAGOSCOPIC PICTURE OF HEPATOPATHY. (Ita.) Fichera, G.; Maroni, G. C.; Facchinetti, F. (Clinica Chirurgica Generale I, Universita di Milano, Milan, Italy). *Minerva Dietol. Gastroenterol.* 23(2):99-102; 1977.

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5371 EVALUATION OF ^{99m}Tc-HIDA COMPLEX AS A CHOLESCINTIGRAPHIC AGENT. (Jpn.) Saji, H.; Yokoyama, A.; Arano, Y.; Tanaka, H.; Odori, T.; Morita, R.; Torizuka, K. (Faculty Pharmaceutical Sciences, Kyoto Univ., Yoshida Shimoadachi-cho, Sakyo-Ku, Kyoto 66, Japan). *Radioisotopes* 26(10): 702-707; 1977.

5372 HEPATOBILIARY SCINTIGRAPHY WITH ^{99m}Tc-DIETHYL-IDA. (Ger.) Biersack, H. J.; Thelen, M.; Knopp, R.; Breuel H. P.; Winkler, C. (Insitut fur klinische und experimentelle Nuklearmedizin, Universitat Bonn, Bonn, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 127(5):422-427; 1977.

5373 POLYCYSTIC LIVER DISEASE: HEPATOBILIARY SEQUENTIAL SCINTIGRAPHY IN COMPARISON WITH OTHER DIAGNOSTIC PROCEDURES. (Ger.) Reichelt, H. G. (Dept. Radiologie der Medizinischen Hochschule, Karl-Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *Radiologe* 17(9):396-400; 1977.

5374 HEPATOBILIARY SEQUENTIAL SCINTIGRAPHY: DEVELOPMENTS, METHODS, AND RECOMMENDATIONS FOR ITS CLINICAL USE: EXPERIENCE IN 350 PATIENTS WITH ^{99m}Tc-SOLCOSCINT-HEPATOBIDA. (Ger.) Reichelt, H. G. (Department fur Radiologie der Medizinischen Hochschule Hannover, 3000 Hannover 61, W. Germany). *Fortschr. Geb. Roentgenstr. Nuklearmed.* 127(5): 427-433; 1977.

5375 COMPUTERIZED AXIAL TOMOGRAPHY OF THE LIVER. (Fre.) Osteaux, M.; Striyven, J.; Bleiberg, H.; Peetrons, Ph., Engelholm, L.; Jeanmart, L. (No affiliation given). *Rev. Fr. Gastroenterol.* (134):58; 1977.

5376 USE OF THE HEMAGGLUTINATION REACTION IN THE SEROLOGICAL DIAGNOSIS OF SCHISTOSOMIASIS. (Fre.) Tribouley, J.; Tribouley-Duret, J.; Appriou, M.; Bernard, D.; Pautrizel, R. (Laboratoire d'Immunologie et de Biologie Parasitaire, Universite de Bordeaux II, Bordeaux, France). *Bull. W.H.O.* 54(6):695-702; 1976.

See also, 5075, 5100, 5104, 5105, 5227, 5262, 5381, 5386, 5389, 5433, 5440, 5443, 5447, 5454, 5455, 5460, 5495, 5504, 5512, 5516, 5523, 5526, 5539, 5546, 5553, 5564, 5568, 5578, 5579, 5590, 5597, 5608, 5610, 5626, 5634, 5646, 5649, 5656, 5663, 5673, 5674, 5680, 5684, 5721, 5749, 5758, 5764, 5807, 5808, 5812, 5822, 5840, 5842.

GASTROINTESTINAL DISEASES

ESOPHAGUS

5377 LONGITUDINAL ESOPHAGEAL BANDS ASSOCIATED WITH ESOPHAGEAL APERISTALSIS: SPECULATIONS ON PATHOGENESIS. (Eng.) Stillman, A. E.; Larter, W.; Goldman, D. S. (5200 E. Grant Rd., Suite 611, Tucson, AZ 85712). *Gastroenterology* 74(3):592-594; 1978.

The case of a 6-yr-old girl with ataxia telangiectasia syndrome who was found to have multiple bands longitudinally traversing her esophagus and esophageal aperistalsis is presented. In the past, the patient was also known to have had esophageal candidiasis. The bands may have been congenital or may have been produced when linear ulcers caused by fungal esophagitis undermined mucosal strips and then healed, leaving tissue bands attached only at their extremities to the esophageal wall. The esophageal motor dysfunction may have been attributable to esophageal candidiasis or may have been a hitherto unrecognized component of the ataxia telangiectasia syndrome.

5378 MALIGNANT TRANSFORMATION OF ESOPHAGEAL COLUMNAR EPITHELIUM. (Eng.) Berenson, M. M.; Riddell, R. H.; Skinner, D. B.; Freston, J. W. (Univ. Medical Center, Salt Lake City, UT 84132). *Cancer* 41(2):554-561; 1978.

Two patients with esophageal columnar epithelium in which microinvasive adenocarcinoma developed are described. The first patient had multiple foci of carcinoma *in situ* contiguous with epithelium resembling gastric and intestinal mucosa. The other patient had signet-ring type adenocarcinoma. Surveillance for malignant transformation in columnar esophageal epithelium should be routinely performed, and because of its focal nature, multiple biopsies and cytologic examination should be carried out. The presence of carcinoma *in situ* should lead to consideration of excision of the affected esophagus.

5379 CHRONIC MUCOCUTANEOUS CANDIDIASIS: RADIOLOGIC ABNORMALITIES IN THE ESOPHAGUS. (Eng.) Rohrmann, C. A., Jr.; Kidd, R. (Univ. Washington Sch. Medicine, Seattle, WA 98195). *Am. J. Roentgenol.* 130(3):473-476; 1978.

The clinical and radiographic features of four new and four previously reported cases of esophageal chronic mucocutaneous candidiasis are presented. Esophageal narrowing was found in all patients; it was focal in six and diffuse in two. Motor abnormalities were common, but mucosal changes seen characteristically in acute candidal esophagitis were unusual. Esophageal intramural pseudodiverticulosis was documented in one patient, substantiating the belief that *Candida* may be the etiologic agent in some patients with this condition.

5380 CONTROLLED TRIAL OF A NEW DOSAGE FORM OF CARBENOXOLONE (PYROGASTRONE) IN THE TREATMENT OF REFLUX ESOPHAGITIS. (Eng.) Reed, P. I.; Davies, W. A. (Hammersmith Hosp., London W12 OHS, England). *Am. J. Dig. Dis.* 23(2):161-165; 1978.

A new preparation combining carbenoxolone sodium with alginate antacid (Pyrogastrone) was compared with alginate antacid alone (Gaviscon-like) in a controlled double-blind study in 37 patients with endoscopically proved reflux esophagitis. The patients received Pyrogastrone (100 mg/day) or alginate antacid alone, p.o., for 8 weeks. Complete remission or persistence of only minimal symptoms was obtained in 89%, and esophageal ulcer healing was achieved in 100% of subjects taking Pyrogastrone, compared with only 50% ($p<0.025$) and 33% ($p=0.02$), resp., on control treatment. Complete endoscopic healing or persistence of only minimal inflammation was seen in 95% on Pyrogastrone and 67% of controls ($p<0.05$). Mild biochemical and clinical changes were noted in 9 of 19 patients on Pyrogastrone and 6 of 18 on the control drug, but none required treatment or alteration in regime. Thus, Pyrogastrone is more effective in the treatment of reflux esophagitis than the most efficacious compound in current use.

5381 AN ASSESSMENT OF THE ACCURACY OF MODERN ENDOSCOPIC DIAGNOSIS OF OESOPHAGEAL STRICTURE. (Eng.) Eastman, M. C.; Gear, M. W. L.; Nicol, A. (Gloucestershire Royal Hosp., Gloucestershire, England). *Br. J. Surg.* 63(3):182-185; 1978.

The results of 135 fiberoptic endoscopic examinations of 115 patients with benign or malignant esophageal strictures were studied to assess the accuracy of endoscopic diagnosis of esophageal stricture. The endoscopic diagnosis was correct in 90%, uncertain in 3%, and incorrect in 7% of these cases. Target biopsy and brush cytology each made a significant contribution to diagnosis. The routine collection of cytological specimens in addition to the more commonly obtained histological specimens is strongly advocated. The mean survival in 58 cases of malignant stricture was 6 months, which supports the assumption that a stricture is likely to be benign if 12 months have elapsed without signs of malignancy.

5382 DOES THE OESOPHAGEAL BALLOON COMPRESS OESOPHAGEAL VARICES? (Eng.) Agger, P.; Andersen, J. R.; Burcharth, F. (Gentofte Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 13 (2):225-227; 1978.

To investigate the mechanism by which the esophageal balloon stops bleeding from esophageal varices, the pressure transmitted to the esophageal wall was measured in three patients with bleeding esophageal varices controlled by balloon tamponade. The pressure transmitted was considerably lower than the pressure inflated (5.1, 10.3, and 29.0 mm Hg with an inflation pressure of 40 mm Hg), and all patients suffered retrosternal pain when the transmitted pressure rose to 40 mm Hg. Furthermore, the diameters of esophageal balloons of 23 Sengstaken-Blakemore tubes (Rusch) were measured at increasing inflation pressure. The compliance was very high. All balloons bulged at median inflation pressures of 75 mm Hg, and the pressures fell to a median of 55 mm Hg, unaffected by further inflations. The diameter at 40 mm Hg was 27.3 mm. It still remains to be explained how the esophageal balloon of the Sengstaken-Blakemore tube effects hemostasis in bleeding esophageal varices.

5383 PROBLEMS OF ACUTE UPPER GASTROINTESTINAL HEMORRHAGE. (Ger.) Feifel, G.; Heberer, G. (Chirurgische Universitatsklinik, Nussbaumstrasse 20, D-8000 Munich 2, W. Germany). *Chirurg* 48(4): 204-211; 1977.

5384 SOME TYPES OF COCKTAILS IN THE TREATMENT OF REFLUX ESOPHAGITIS DUE TO ULCER DISEASE. (Rus.) Serebrina, L. A.; Mavrodiy, V. M. (Odessa Scientific Res. Inst. Balneology, Odessa, USSR). *Vrach. Delo* (3):17-20; 1977.

5385 SURGICAL TREATMENT OF ADULTS WITH HIATAL HERNIA. (Ita.) Tantini, E. (Istituto di Semeiotica Chirurgica, Universita degli Studi, Padua [Sedo di Verona], Italy). *Minerva Med.* 68(31): 2147-2149; 1977.

5386 MALLORY-WEISS SYNDROME: REPORT OF 68 CASES DIAGNOSED AMONG 603 PATIENTS WITH DIGESTIVE TRACT HEMORRHAGE AT SAINT-LUC HOSPITAL AND AT THE MONTREAL GASTROENTEROLOGY CENTER. (Fre.) Farley, A.; Levesque, D.; Archambault, A.; Gagnon, M.; Giroux, Y.; Gosselin, D.; *et al.* (Centre de Gastroenterologie de Montreal, suite 101, 235 est, boul. Dorchester, Montreal, Quebec, Canada). *Union Med. Can.* 106(5):652-656; 1977.

5387 CLINICO-ROENTGENOLOGICAL CHARACTERISTICS OF RETROSTERNAL SMALL INTESTINE ESOPHAGUS. (Rus.) Fomin, P. D.; Brovko, T. A. (Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (3):6-10; 1977.

5388 SURGICAL TREATMENT OF ESOPHAGEAL OBSTRUCTION. (Rus.) Shalimov, A. A.; Goyer, Ya. V.; Sayenko, V. F.; Shalimov, S. A. (Kiev Scientific Res. Inst. Clinical Experimental Surgery, Kiev, USSR). *Klin. Khir.* (3):1-6; 1977.

5389 ROENTGENO-MANOMETRIC CHARACTERISTICS OF ESOPHAGEAL FUNCTIONAL STATE IN SCLERODERMA SYSTEMICA, RHEUMATOID ARTHRITIS, AND SYSTEMIC LUPUS ERYTHEMATOSIS. (Rus.) Zhegin, V. A.; Friesen, B. N. (Iarosvlavl Medical Inst., Iaroslavl, USSR). *Vestn. Rentgenol. Radiol.* (2):3-10; 1977.

5390 NEONATAL ANTERIOR ESOPHAGEAL PERFORATION. (Eng.) Stein, R. T.; Wall, P. M.; Kaufman, R. A.; Lamprecht, C.; Roloff, D. W. (Univ. Michigan Medical Center, Ann Arbor, MI 48109). *Pediatrics* 60(5):744-746; 1977.

5391 CENTRAL HEMODYNAMICS IN ACUTE GASTROINTESTINAL BLEEDING. (Eng.) Sorensen, M. B.; Christiansen, L. A.; Malmstrom, J.; Bille-Brahe, N. E. (Rigshospitalet, Copenhagen, Denmark). *Surg. Gynecol. Obstet.* 145(5):685-690; 1977.

5392 OESOPHAGEAL ATRESIA: TRIUMPH AND TRAGEDY. (Eng.) Rickham, P. P.; Stauffer, U. G.; Cheng, S. K. (Univ. Children's Hosp., Steinwiesstr. 75, 8032 Zurich, Switzerland). *Aust. N.Z. J. Surg.* 47(2):138-143; 1977.

5393 BOERHAAVE'S SYNDROME: SPONTANEOUS FORMATION OF AN ESOPHAGEAL-BRONCHIAL FISTULA. (Eng.) Zenone, E. A.; Trotman, B. W. (Univ. Pennsylvania Sch. Medicine, Philadelphia, PA). *JAMA* 238(19):2048-2049; 1977.

5394 SO-CALLED PSEUDOSARCOMA OF THE ESOPHAGUS. NODAL METASTASES OF THE SPINDLE CELL ELEMENT. (Eng.) Martin, M. R.; Kahn, L. B. (Univ. North Carolina Sch. Medicine, Chapel Hill, NC 27514). *Arch. Pathol. Lab. Med.* 101(11):604-609; 1977.

5395 ABNORMAL GASTRIC EMPTYING IN PATIENTS WITH GASTROESOPHAGEAL REFLUX. (Eng.) Little, A. G.; DeMeester, T. R.; Rezai-Zadeh, K.; Skinner, D. B. (Univ. Chicago Pritzker Sch. Medicine, Chicago, IL). *Surg. Forum* 28:347-348; 1977.

5396 MIDESOPHAGEAL WEB IN ADULTS. (Eng.) Ikard, R. W.; Rosen, H. E. (Park View Hosp., Nashville, TN). *Ann. Thorac. Surg.* 24(4): 355-358; 1977.

5397 VARICEAL HEMORRHAGE AMONG PATIENTS WITH VARICES AND UPPER GASTROINTESTINAL HEMORRHAGE. (Eng.) Pitcher, J. L. (William Beaumont Army Medical Center, P.O. Box 70031, El Paso, TX 79920). *South. Med. J.* 70(10):1183-1185; 1977.

5398 ESOPHAGEAL PAPILLOMATOSIS: CASE REPORT. (Eng.) Nuwayhid, N. S.; Ballard, E. T.; Cotton, R. (Univ. Cincinnati Medical Center, Cincinnati, OH 45267). *Ann. Otol. Rhinol. Laryngol.* 86(5, Part 1):623-625; 1977.

5399 INTRAMURAL PSEUDODIVERTICULOSIS OF THE ESOPHAGUS. (Eng.) Shapiro, M. J.; Sloan, W. C. (New Jersey Medical Society, 150 South 19th St., Newark, NJ 07107). *Ann. Otol. Rhinol. Laryngol.* 86(5, Part 1):594-597; 1977.

5400 LARYNGOTRACHEOESOPHAGEAL CLEFT: THE ANTERIOR APPROACH. (Eng.) Bell, D. W.; Christiansen, T. A.; Smith, T. E., Jr.; Stucker, F. J. (Chestnut Hill Medical Center, 25 Boylston St., Chestnut Hill, MA 02167). *Ann. Otol. Rhinol. Laryngol.* 86(5, Part 1):616-622; 1977.

See also, 5127, 5131, 5297, 5298, 5325, 5343, 5354, 5355, 5401, 5430, 5445, 5463, 5467, 5471, 5503, 5730, 5731, 5776.

STOMACH

5401 THE INTERRELATIONS OF GASTRIN RELEASE, ANTRAL GASTRIN CONCENTRATION AND ACID SECRETION RATE. (Eng.) Hughes, W. S.; Wharton, E. (Univ. Texas Medical Branch, Galveston, TX 77550). *Digestion* 17(2):151-158; 1978.

The interrelations of meal stimulated gastrin release, antral gastrin concentration (AGC), and acid secretion rate were examined in 72 patients with gastrointestinal symptoms. Gastrin release calculated as the integrated gastrin output was directly related to AGC ($r=0.50$, $p<0.001$) and inversely related to maximum acid output (MAO, $r=-0.31$, $p<0.01$). The relation between integrated gastrin output and AGC was significant in 21 patients with low acid secretion rates (MAO of <10 mEq/hr, $r=0.66$, $p<0.01$) and in 27 patients with normal acid secretion rates (MAO of 10-25 mEq/hr, $r=0.56$, $p<0.05$), but not in 24 patients with high acid secretion rates (MAO of >25 mEq/hr, $r=0.35$, $p>0.05$). A weak inverse relation between AGC and MAO may exist in patients with low acid secretion rates ($r=0.40$, $p<0.10$). Considered together by using multiple regression procedures, AGC and MAO explained less than half of the variability in meal stimulated gastrin release. The findings suggest that the exceptionally high serum gastrin levels in patients with gastric atrophy may be due to a combination of a high AGC and a low MAO.

5402 SERUM LEVEL OF IMMUNOREACTIVE GASTRIN: INFLUENCE OF KIDNEY FUNCTION. (Eng.) Hallgren, R.; Karlsson, F. A.; Lundqvist, G. (Univ. Hosp., S-750 14 Uppsala, Sweden). *Gut* 19(3):207-213; 1978.

The influence of the glomerular filtration rate (GFR) on the serum levels of gastrin and of β_2-microglobulin were investigated in 70 patients with chronically reduced GFR as estimated by ^{51}Cr-EDTA clearance, creatinine, and β_2-microglobulin values and in 31 other patients with uremia and on chronic maintenance hemodialysis (including 11 renal transplant patients). A strong dependence upon GFR was found among the former 70 patients, although the correlation between gastrin levels and GFR ($r=0.45$, $p<0.001$) was not as high as that between β_2-microglobulin and GFR ($r=0.93$, $p<0.001$), indicating the existence of extrarenal factors regulating the levels of circulating gastrin. In the group of 31 patients on maintenance dialysis, the mean gastrin level was 65.9 pM--that is, a fourfold increase compared to healthy subjects. Three uremic patients had pronounced rises in serum gastrin in the range 800-1,800 pM. The influence of acute alterations of kidney function on serum gastrin was studied in the 11 patients undergoing renal transplantation. In addition to a GFR dependence, the results indicated the existence of feedback mechanisms in gastrin homeostasis. Although the clinical importance of the increased gastrin levels in renal failure is unknown, hypergastrinemia occurs with sufficient frequency to be involved in upper gastrointestinal complications of uremic patients.

5403 COMPARISON OF 'EARLY GASTRIC CANCER' IN BRITAIN AND JAPAN. (Eng.) Evans, D. M. D.; Craven, J. L.; Murphy, F.; Cleary, B. K. (Llandough Hosp., Penarth, Cardiff, Wales). *Gut* 19(1): 1-9; 1978.

To determine whether Japanese gastric cancer is the same as the European variant, the morphology, histology, and behavior of "early gastric cancer" in one British series were compared with those in a Japanese series. Before the introduction of endoscopy, 4 of 720 cases of gastric cancer were diagnosed before the cancer had breached the muscularis propria. Using endoscopy and endoscopic biopsy, 10 of 101 cases of gastric cancer were diagnosed at this "early" stage. The clinical, morphological, and histological characteristics of these cancers were similar to those in the Japanese series. The results suggest that a higher proportion of British gastric cancers could be diagnosed at an "early" stage by more intensive investigation of dyspeptic patients using up-to-date radiological techniques, fiberoptic endoscopy, and endoscopic biopsy.

5404 PATHOGENESIS OF GASTRIC CANCER IN PERNICIOUS ANAEMIA. (Eng.) Ruddell, W. S. J.; Bone, E. S.; Hill, M. J.; Walters, C. L. (General Infirmary, Leeds 1, England). *Lancet* 1(8063): 521-523; 1978.

To investigate the increased incidence of gastric cancer observed in pernicious anemia (PA), nitrite concentrations were determined in the gastric juice from 13 fasting patients with PA and 13 age-matched controls, and bacterial studies were carried out. In an attempt to mimic the situation *in vivo*, simulated PA gastric juice was prepared *in vitro* and incubated with bacteria derived from the gastric juice of the patients with PA; nitrite was added to produce a concentration approximating that found *in vivo*. The incubate was extracted, and the extract analyzed for volatile nitrosamines by gas chromatography coupled with a thermal energy analyzer. The mean nitrite concentration in gastric juice from the fasting patients with PA was nearly 50-fold greater than that of age-matched controls ($p<0.001$). The number of bacteria in the gastric juice of PA patients was also greatly increased ($p<0.001$). Small amounts of volatile nitrosamines were detected in the simulated PA gastric juice *in vitro*, after addition of nitrite. If similar nitrosation occurs *in vivo*, the intragastric production of carcinogenic *N*-nitroso compounds could explain the high incidence of gastric cancer in patients with PA.

5405 ADENOCARCINOMA OF THE STOMACH: REVIEW OF 1,497 CASES. (Eng.) Dupont, J. B., Jr.; Lee, J. R.; Burton, G. R.; Cohn, I., Jr. (Louisiana State Univ. Sch. Medicine, 1542 Tulane Ave., New Orleans, LA 70112). *Cancer* 41(3):941-947; 1978.

The records of 1,497 patients with histologically proven adenocarcinoma of the stomach are reviewed in one hospital over the 25-yr period 1948 to 1973. The operability rate was 82%, and the resectability rate was 48%. Gastric carcinoma predominated in men and Negroes. Necropsy studies indicated a similar frequency of involvement of various organs in patients not operated upon as well as those subjected to a prior operation, which suggests the need for therapy aimed at a wider base than the primary organ. The overall 5-yr survival rate was 7.4% and varied from 2.0% after esophagogastrectomy to 22.1% after radical subtotal gastrectomy and to 30.3% for those with localized disease. One hundred one patients survived 5 yr or more, and 5.4% survived 10 yr or more after the diagnosis of gastric cancer. Radical subtotal gastrectomy gave the best results in this series, whether measured in terms of median survival, 5-yr survival, or operative mortality. Esophagogastrectomy and bypass procedures had high mortality and low survival rates, and should be reserved for special conditions.

5406 DISSEMINATED HISTOPLASMOSIS PRODUCING HYPERTROPHIC GASTRIC FOLDS. (Eng.) Fisher, J. R.; Sanowski, R. A. (Phoenix Indian Medical Center, 4212 N. 16 St., Phoenix, AZ 85016). *Am. J. Dig. Dis.* 23(3):282-285; 1978.

The case of a 31-yr-old man with disseminated histoplasmosis who had hypertrophic gastric rugae on upper gastrointestinal x-ray is described. Endoscopic biopsy of the giant folds revealed submucosal fungal elements that subsequently grew *Histoplasma capsulatum* on culture. This patient represents the first reported case of histoplasmosis involving the stomach that caused giant rugae. Recognition of this infectious process and the differentiation of it from malignancy allowed for its prompt treatment with amphotericin B and good clinical response, although the patient was lost to follow-up after 10 weeks of treatment.

5407 CIMETIDINE: PROPHYLAXIS AGAINST UPPER GASTROINTESTINAL HAEMORRHAGE AFTER RENAL TRANSPLANTATION. (Eng.) Jones, R. H.; Rudge, C. J.; Bewick, M.; Parsons, V.; Weston, M. J. (King's Coll. Hosp., London SE22, England). *Br. Med. J.* 1(6110):398-400; 1978.

To assess the place of cimetidine for the prevention of gastrointestinal hemorrhage following renal transplantation, the incidence of upper gastrointestinal bleeding within 4 months of transplantation was studied in 63 patients. Thirty patients who received prophylactic cimetidine suffered no episodes of upper gastrointestinal hemorrhage, while 6 of the 33 patients who did not receive cimetidine suffered hemorrhages. One patient died as a result. The difference between the groups was significant ($p=0.016$). The results suggest that the prophylactic use of cimetidine in patients receiving renal transplants is worthwhile.

5408 CIMETIDINE IN THE TREATMENT OF GASTRIC ULCER: REVIEW AND COMMENTARY. (Eng.) Freston, J. W. (Univ. Utah Medical Center, 50 N. Medical Drive, Salt Lake City, UT 84132). *Gastroenterology* 74(2, Part 2):426-430; 1978.

The results of four complete and one incomplete controlled, double-blind trials of cimetidine therapy for gastric ulcer disease are reviewed. A sixth trial, still under way, is partially blind. Treatment duration ranged from 2 to 6 weeks; doses ranged from 0.8 to 1.2 g daily. Two studies also evaluated the influence of hospitalization on ulcer healing and symptoms. Relatively large doses of antacid taken with cimetidine confounded the evaluation of cimetidine efficacy in two of the trials, without answering the question of antacid efficacy. Cimetidine was more effective than were small doses of antacid in healing ulcers in one study but was not significantly superior to treatment with larger quantities of antacid in two other trials. The preliminary results indicate that cimetidine is more effective than carbenoxolone in healing ulcers. Hospitalization for 2 and 3 weeks conferred no advantage, but patients were not randomly assigned to hospitalization. Definitive studies on whether cessation of cimetidine therapy is followed by accelerated ulcer recurrence have not been reported. The efficacy of chronic or intermittent cimetidine therapy has not been studied in gastric ulcer disease.

5409 REDUCTION OF ASPIRIN-INDUCED GASTROINTESTINAL BLEEDING WITH CIMETIDINE.

(Eng.) Welch, R. W.; Bentch, H. L.; Harris, S. C. (Univ. Texas Health Science Center at San Antonio, San Antonio, TX 78284). *Gastroenterology* 74(2, Part 2): 459-463; 1978.

The effect of cimetidine on aspirin-induced gastric bleeding was investigated in 26 arthritic patients taking fixed doses of aspirin who were found to have aspirin-induced occult gastrointestinal bleeding. The patients were given cimetidine (300 mg/day, 4 weeks) in a randomized double blind, crossover study. Autologous ^{51}Cr-labeled blood was measured in 4-day stool collections at the end of each 4-week period of placebo and cimetidine therapy in 22 acid-producing patients. Mean daily fecal blood loss was reduced during cimetidine therapy to 2.2 ± 0.3 ml/day, compared with 4.1 ± 0.7 ml/day during placebo therapy ($p=0.002$). These results emphasize the central role of gastric acid in aspirin-induced gastric mucosal bleeding and demonstrate that cimetidine exerts a protective effect on aspirin-induced mucosal bleeding. The therapeutic necessity for combining cimetidine and aspirin depends upon the seriousness of the bleeding and should be explored further by studying only those patients with clinically significant bleeding.

5410 AGE, SEX, GASTRIN AND ACID SECRETION IN DIFFERENT TYPES OF GASTRIC ULCER.

(Eng.) Vezzadini, P.; Cipollini, F.; Tomassetti, P.; Bonora, G.; Cavicchi, A.; Labo, G. (Istituto di Clinica Medica e Gastroenterologia, Via G. Massarenti 9, 40138 Bologna, Italy). *Rend. Gastroenterol.* 9(3): 194-198; 1977.

Fasting serum gastrin levels, maximal acid response to pentagastrin, age, and sex distribution were studied in 124 patients with gastric ulcer to evaluate possible differences in these variables. Similar data were recorded in 119 patients with duodenal ulcer (DU) not associated with gastric ulcer. Of the 124 patients, 45 had a body ulcer (BU), 40 a prepyloric ulcer (PPU), and 39 a gastric ulcer associated with duodenal ulcer (GU-DU). The mean age of the BU patients was 57 ± 2 yr, significantly different ($p<0.01$) from the PPU (48 ± 3 yr), the GU + DU (43 ± 2 yr), and the DU (40 ± 1 yr) patients. The male/female ratio was 1.3:1 in BU, 3.0:1 in PPU, 8.7:1 in GU + DU, and 4.6:1 in DU patients. The mean fasting gastrin levels in the BU group were 147 ± 22 pg/ml, significantly different ($p<0.001$) from the PPU (52 ± 4 pg/ml), GU + DU (53 ± 5 pg/ml), and DU (49 ± 2 pg/ml) patients. The peak acid output (PAO) in BU patients was 8.1 ± 1.4 mmol/hr, significantly different ($p<0.001$) from the PPU (25.0 ± 1.9 mmol/hr), GU + DU (33.3 ± 3.1 mmol/hr), and DU (34.5 ± 1.1 mmol/hr) patients. In the BU group, there was an inverse correlation ($p<0.05$) between gastrin levels and PAO. It appears that BU differs substantially from the other two types of gastric ulcer. PPU differs from GU + DU only with regard to acid secretion.

5411 MEASUREMENT OF BILE ACIDS IN FASTING GASTRIC ASPIRATES: AN OBJECTIVE TEST FOR BILE REFLUX AFTER GASTRIC SURGERY.

(Eng.) Hoare, A. M.; Keighley, M. R. B.; Starkey, B.; Alexander-Williams, J. (Wycombe General Hosp., High Wycombe, Bucks, England). *Gut* 19(3):166-169; 1978.

The concentration of bile acids were measured, as a test for duodenal reflux, in gastric aspirates from 14 patients who had had operations for peptic ulcer. Twenty patients were asymptomatic, and 22 had postoperative symptoms of the type that have been attributed to duodenogastric reflux. Samples were obtained *via* a nasogastric tube when the patients were fasting, after food, after pentagastrin, and overnight. The most useful index to discriminate between symptomatic and asymptomatic patients was the amount of bile reflux in 0.5-hr aspiration from the fasting stomach; this was termed "fasting bile reflux" (FBR) and expressed as μmol bile acids refluxing/hr. A figure greater than 120 μmol/hr was present in 17 of 22 symptomatic patients and in all who complained of bile regurgitation or bile vomiting. The FBR was less than 120 μmol/hr in all of 20 asymptomatic patients, although 13 had reflux detected radiologically and endoscopically. Measurement of bile acids in fasting gastric aspirates has proved to be the best discriminant between patients with and without symptoms.

5412 LOWER ESOPHAGEAL SPHINCTER PRESSURE AND SERUM GASTRIN LEVELS AFTER MAPPED ANTRECTOMY.

(Eng.) Eckardt, V. F.; Grace, N. D.; Osborne, M. P.; Fischer, J. E. (Faulkner Hosp., 1153 Center St., Boston, MA 02130). *Arch. Intern. Med.* 138(2): 243-245; 1978.

The effect of mapped antrectomy with gastroduodenostomy on serum gastrin levels in fasting patients and on resting lower esophageal sphincter (LES) pressure was investigated to evaluate the role of endogenous gastrin in the maintenance of LES competence. Serum gastrin levels in fasting patients were lower in the 15 who had an antrectomy without vagotomy ($p<0.05$) as compared with 11 controls who had both antrectomy and vagotomy. Resting LES pressure was similar in both patients and controls and was not affected by the presence or absence of vagotomy. These findings suggest that (a) mapped antrectomy and gastroduodenostomy without vagotomy are followed by a decrease in serum gastrin and (b) resting LES pressure is not affected by mapped antrectomy and a decrease in serum gastrin level.

5413 THE VIBRATION PERCEPTION THRESHOLD IN GASTRECTOMIZED PATIENTS WITH LOW SERUM

B_{12}: A CLINICAL AND BIOTHESIOMETRIC FOLLOW-UP AFTER INTENSIVE B_{12} THERAPY. (Eng.) Roos, D. (Sundvaenget 35, 2900 Hellerup, Denmark). *Acta Neurol. Scand.* 56(6):551-562; 1977.

The vibration perception threshold (VPT) was determined in vitamin B_{12}-deficient (<200 pg/ml) gastrectomized patients and controls to determine whether VPT is significantly higher in the vitamin-deficient gastrectomized patients. The course of clinical signs of neuropathy and myelopathy after 6-12 months of intensive B_{12} therapy is detailed. The values for VPT are given as the $\log_{10}$ of the minimum voltages at which the subject clearly perceived the stimuli as a vibrating sensation. In 42 gastrectomized patients, VPT was significantly elevated as compared with that in 78 controls; after allowing for age, the VPTs calculated for the gastrectomized patients were lower than those of controls by 0.07 in the pulp of the index finger, 0.09 in the medial malleolus, and 0.15 in the pulp of the big toe ($p<0.01$, 0.05, and 0.001, resp.). The neuropathologic signs of 15/25 patients receiving adequate vitamin B_{12} therapy (1 ml Betolvex®/2 weeks, group I) included paraesthesiae (10/15), regressed achilles or patellar reflexes (14/15), hypaesthesia-hypalgesia distally on the lower limbs or on the lower and upper limbs (10/15), and localized pareses and muscular atrophy (5/15). The myelopathologic signs of 16/25 patients receiving adequate vitamin B_{12} therapy (group II) included ataxia of the upper (2/16) and lower limbs (5/16), an abnormal Romberg's sign (6/16), weak extensor plantar responses (5/15), and a lack of vibration sense in spina iliaca anterior superior (4/16). Forty patients were followed up after 6-12 months of intensive vitamin B_{12} therapy. Group I patients demonstrated a remission of symptoms and signs of peripheral neuropathy, including a statistically significant reduction of the VPT measured on the medial malleolus and big toe. No reduction was observed in group II. Findings in the inadequately treated group were less definite, both as regards remission of clinical findings and VPT. In four untreated patients, the neurological symptoms and signs progressed during the follow-up period. Intensive and long-lasting treatment with vitamin B_{12} is recommended for gastrectomized patients showing signs of neuropathy.

5414 VALUE OF BILE-ACID BINDING AGENTS IN POST-VAGOTOMY DIARRHOEA. (Eng.) Taylor, T. V.; Lambert, M. E.; Torrance, H. B. (Royal Infirmary, Edinburgh EH3 9YW, England). *Lancet* 1(8065): 635-636; 1978.

The effect of agents that either bind bile acids or prevent their action on the colonic mucosa was studied in 31 patients with postvagotomy diarrhea. Fifteen patients had had vagotomy and pyloroplasty (VP) alone and 16 vagotomy, pyloroplasty, and cholecystectomy (VPC). Twelve patients who had undergone VPC improved after cholestyramine treatment (12 g/day, 4 weeks), whereas only six of those who had undergone VP improved ($p=0.044$). Aluminum hydroxide in large doses (30 ml/day, 4 weeks) improved the symptoms in five patients who had undergone VPC and one who had undergone VP. In eight patients (4 in each group) who received propranolol (60 mg/day), there was either no improvement, or the symptoms worsened. This study suggests that the excretion and chemical composition of bile and the handling of bile acids by the small intestine is of fundamental importance in the pathogenesis of postvagotomy diarrhea.

5415 ASCORBIC ACID AND CHOLINESTERASE ACTIVITY OF THE BLOOD IN GASTRODUODENITIS PATIENTS. (Rus.) Lukianchuk, V. G.; Shubravskii, A. A. (Propedeutic Dept. Internal Medicine, Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* 8:36-38; 1976.

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Walters, K. M. (Dept. Medicine, Univ. Coll., Galway, Ireland). *J. Physiol. (Lond.)* 273(2):61P-62P; 1977.

5424 EFFECTS OF TOTAL GASTRECTOMY ON EXOCRINE PANCREATIC FUNCTION IN MAN [Abstract]. (Eng.) Gullo, L.; Costa, P. L.; Ventrucci, M.; Fontana, G.; Labo, G. (Dept. Medicine, Univ. Bologna, Bologna, Italy). *Ir. J. Med. Sci.* 146(Suppl. 1):29; 1977.

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5430 OESOPHAGITIS AND OESOPHAGEAL STRICTURE AFTER GASTRECTOMY [Abstract]. (Eng.) Kalima, T. V.; Hakkiluoto, A. (Univ. Central Hosp., Helsinki, Finland). *Scand. J. Gastroenterol.* 12 (Suppl. 45):44; 1977.

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5451 EXULCERATED NEUROFIBROMA OF THE STOMACH. (Ger.) Wissmann, C.; Appel, W. (Medizinisches Strahleninstitut der Universitat Tubingen, Rontgenweg 11, 7400 Tubingen, W. Germany). *Fortschr. Geb. Rontgenstr.* 127(1):77-78; 1977.

5452 GIANT GASTRIC NEURINOMA. (Ger.) Jacob, H.; May, D. (Chirurgische Klinik des Stadtischen Krankenhauses Prenzlauer Berg, Dimitroffstrasse 75, DDR-1055 Berlin, E. Germany). *Zentralbl. Chir.* 102(9):558-560; 1977.

5453 PREOPERATIVE DIAGNOSIS OF THE DUMPING SYNDROME. (Rus.) Soroka, A. M.; Sayenko, V. F.; Furmanenko, E. D. (Kiev Scientific Res. Inst. Clinical Experimental Surgery, Kiev, USSR). *Klin. Khir.* (3):59-62; 1977.

5454 CLINICO-FUNCTIONAL AND MORPHOLOGICAL COMPARISONS IN CHRONIC GASTRITIS AND INDICATIONS FOR INSTRUMENTAL EXAMINATION OF THE STOMACH IN CHILDREN. (Rus.) Volkov, A. I.; Ulyanycheva, M. F.; Shakhova, N. B. (Gor'kii Scientific Res. Inst. Pediatrics, Gor'kii, USSR). *Pediatriia* (3):46-51; 1977.

5455 SOME AUXILIARY METHODS OF EXAMINATION OF PATIENTS WITH CHRONIC GASTRITIS. (Rus.) Glubochenko, V. G. (Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* (5):5-9; 1977.

5456 SOME PROBLEMS OF PROPHYLAXIS AND TREATMENT OF POSTRESECTION GASTRITIS. (Rus.) Zaitsev, V. T.; Alekseyenko, V. E.; Galimova, L. I.; Peyev, B. I. (Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (3):11-15; 1977.

5457 GASTROZEPIN IN ULCER AND GASTRITIS. (Ger.) Anonymous. (No affiliation given). *Therapiewoche* 27(31):5558-5559; 1977.

5458 PRESCRIPTIONS FOR HYPERCHLORHYDRIA. (Ita.) Fanelli, V. (No affiliation given). *Clin. Ter.* 81(6):577-581; 1977.

5459 CHARACTERISTICS OF FUNCTIONAL DISTURBANCES OF THE STOMACH, DIFFUSE GASTRITIS, GASTRODUODENITIS, AND DUODENAL ULCER IN CHILDREN. (Rus.) Balashova, T. F. (Perm Medical Inst., Perm, USSR). *Pediatriia* (3):29-31; 1977.

5460 DIFFERENTIAL DIAGNOSIS OF BENIGN AND MALIGNANT ULCERS WITH THE AID OF A COMPUTER. (Rus.) Kadyshes, N. L. (Saratov Medical Inst., Saratov, USSR). *Vestn. Rentgenol. Radiol.* (2):16-20; 1977.

5461 EFFECT OF VAGOTOMY ON THE ULTRASTRUCTURE OF THE PARIETAL CELLS OF THE GASTRIC MUCOSA. (Rus.) Morozov, I. A.; Aruin, L. I.; Nezhdanova, G. A. (Inst. Nutrition, Acad. Medical Science USSR, USSR). *Khirurgiia (Mosk.)* (8):17-21; 1977.

5462 PROTEOLYTIC ACTIVITY OF THE STOMACH IN VIVO IN VARIOUS FUNCTIONAL CONDITIONS OF ITS MUCOSA. (Rus.) Gorshkov, V. A. (Leningrad Sanitary-Hygienic Medical Inst., Leningrad, USSR). *Ter. Arkh.* 49(5):105-110; 1977.

5463 SUTURE INCOMPETENCE OF ESOPHAGEAL ANASTOMOSIS AFTER RADICAL OPERATIONS FOR CANCER OF THE CARDIA. (Rus.) Baskakova, Z. I.; Miroshnikov, B. I.; Karchemnik, E. A. (Leningrad Sanitary-Hygienic Medical Inst., Leningrad, USSR). *Vestn. Khir.* 118(3):40-46; 1977.

5464 SOME INDICES OF WATER-ELECTROLYTE METABOLISM IN ULCEROUS DISEASE AND CANCER OF THE STOMACH. (Rus.) Komakhidze, M. E.; Akhmeteli, T. I.; Papava, R. I. (Tbilisi Medical Inst., Tbilisi, USSR). *Vestn. Khir.* 118(3):126-127; 1977.

5465 SOME PROBLEMS OF PATHOGENESIS, CLINIC, AND TREATMENT OF GASTROPLEGIA FOLLOWING SELECTIVE VAGOTOMY WITH DRAINAGE PROCEDURES ON THE STOMACH. (Rus.) Seniutovich, V. F.; Izbenko, G. S.; Seniutovich, R. V. (Ivano-Frankovsk Medical Inst., Ivano-Frankovsk, USSR). *Klin. Khir.* (3): 15-19; 1977.

5466 CHANGED ASPECTS OF GASTRIC CANCER. (Ger.) Longmire, W. P., Jr. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA 90024). *Munch. Med. Wochenschr.* 119(18):613-616; 1977.

5467 TREATMENT OF HIGH GASTRIC ULCER. (Ger.) Gebhardt, C.; Moschinski, D.; Usmiani, J. (Krankenhaus St. Josef, Bergstrasse, D-5600 Wuppertal 1, W. Germany). *Langenbecks Arch. Chir.* 343 (4):313-318; 1977.

See also, 5141, 5163, 5168, 5173, 5297, 5306, 5308, 5343, 5345, 5354, 5363, 5380, 5383, 5384, 5388, 5395, 5397, 5469, 5474, 5476, 5479, 5482, 5483, 5485, 5487, 5493, 5494, 5495, 5497, 5526, 5532, 5538, 5540, 5595, 5765, 5776, 5781, 5782, 5809, 5816, 5824.

STOMACH

Peptic Ulcers

5468 DUODENAL MOTILITY PATTERN IN DUODENAL ULCER DISEASE. (Eng.) Borgstrom, S.; Arborelius, M., Jr. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Scand. J. Gastroenterol.* 13(3):349-352; 1978.

The motility in the first part of the duodenum was studied in seven normal subjects, seven patients with gastric ulcers, and seven with duodenal ulcers by a method combining roentgen fluorography and multiple pressure recordings. A significantly lower number of retrograde motor sequences was found in patients with duodenal ulcer than in normal subjects ($p=0.05$), while patients with gastric ulcers showed no such difference. This abnormality was interpreted as a deficiency in the transport of neutralized duodenal contents from more distal parts of the duodenum up into the bulb. This abnormality may explain the lower pH observed in the duodenal bulb in subjects with duodenal ulcer and may contribute to the pathogenesis of the disease.

5469 TECHNIQUES AND ERRORS IN SCINTIGRAPHIC MEASUREMENTS OF GASTRIC EMPTYING. (Eng.) Tothill, P.; McLoughlin, G. P.; Heading, R. C. (Royal Infirmary, Edinburgh EH3 9YW, Scotland). *J. Nucl. Med.* 19(3):256-261; 1978.

A double-headed scanner was used to investigate the effects of variations of counting efficiency due to the changing depth of radioactivity during the scintigraphic measurement of gastric emptying. ^{99m}Tc and ^{113m}In were used as labels for the solid and liquid components of a meal. The depth of ^{99m}Tc within the stomach decreased by a mean of 13 mm during the first half-hour of emptying. Anterior detection alone underestimated emptying rates by an average of 26%. Depth changes also introduced errors into "early emptying" measurements made unilaterally. Such artifacts of measurement may compromise mathematical analyses of emptying patterns.

5470 INCREASED SENSITIVITY OF GASTRIN RELEASE TO ADRENALINE IN DUODENAL ULCER. (Eng.)

Brandsborg, O.; Christensen, N. J.; Lovgreen, N. A.; Brandsborg, M.; Rehfeld, J. F. (Kommunehospitalet, Aarhus, Denmark). *Gut* 19(3):202-206; 1978.

Serum gastrin concentrations were measured in 19 patients with duodenal ulcer and 21 controls before, during, and after 1-hr i.v. infusion of various doses of epinephrine (0.12 μg-6 μg/min). Basal gastrin concentrations were significantly increased in duodenal ulcer patients compared to controls ($2p<0.01$). The maximal rise in serum gastrin concentrations was obtained at a dose of 4 μg/min epinephrine in both groups of subjects, and the increase was significantly higher in duodenal ulcer patients than in controls ($2p<0.01$). Epinephrine increased predominantly the gastrin III component (gastrin-17-like) in both duodenal ulcer patients and controls. The threshold level of epinephrine-induced gastrin release was significantly lower in duodenal ulcer patients. I.v. infusion of epinephrine in a dose of 0.12 μg and 0.25 μg/min increased serum gastrin concentrations 23% and 43%, resp., but had no effect in controls. Rises in plasma epinephrine concentrations were similar in both groups of subjects in response to the various doses of catecholamine employed. Only the smallest dose (0.12 μg/min) resulted in clearly physiological variations in plasma epinephrine concentrations. The results indicate that endogenous epinephrine may stimulate gastrin secretion during physiological conditions in patients with duodenal ulcer.

5471 ENDOSCOPIC ELECTROCOAGULATION: AN ALTERNATIVE TO OPERATIVE THERAPY IN BLEEDING PEPTIC ULCER DISEASE. (Eng.)

Volpicelli, N. A.; McCarthy, J. D.; Bartlett, J. D.; Badger, W. E. (Lovelace-Bataan Medical Center, 5400 Gibson Blvd., SE, Albuquerque, NM 87108). *Arch. Surg.* 113(4): 483-486; 1978.

The use of endoscopic electrocoagulation as an alternative to surgery in the treatment of bleeding peptic ulcer disease was examined in 12 high-risk patients with severely bleeding ulcers (6 duodenal, 5 gastric, 1 esophageal). Arrest of the bleeding was permanent in 10; 1 bled again 2 days later, and 1 patient died of nonulcer disease 1 day later. Although this method to control bleeding from peptic ulceration is new, it seems to offer promise especially when treating severely ill people.

5472 A COMPARISON OF UNREFINED WHEAT AND RICE DIETS IN THE MANAGEMENT OF DUODENAL ULCER. (Eng.)

Malhotra, S. L. (11 Garden Reach Rd., Calcutta-43, India). *Postgrad. Med. J.* 54(627):6-9; 1978.

Unrefined wheat and rice diets in the management of duodenal ulcer were compared in 72 chronic duodenal ulcer patients who lived in a rice-eating area. Twenty-one patients were put on an unrefined wheat diet and 21 continued on their previous rice diet. After 5 yr, only 14% of the first group had had relapses compared with 81% of the second group. A similar 5-yr relapse rate (80%) was obtained in a group of 30 patients from another area with a more varied rice diet. The author attributes this difference to the increased mastication required by the unrefined wheat diet, which is associated with an increase in saliva, lower stomach acidity, and reduced bile output.

5473 EFFECT OF HISTAMINE H2-RECEPTOR ANTAGONISTS ON DELAYED HYPERSENSITIVITY. (Eng.)

Avella, J.; Binder, H. J.; Madsen, J. E.; Askenase, P. W. (Yale Univ. Sch. Medicine, 333 Cedar St., New Haven, CT 06510). *Lancet* 1(8065):624-626; 1978.

To determine the effect of cimetidine treatment on cell-mediated immunity *in vivo*, the delayed skin test response to four antigens was assessed before and after 6 weeks' cimetidine therapy in patients with duodenal ulcer disease. In the eight patients who received cimetidine (300 mg q.i.d., p.o.), there was a significant increase in both erythema ($p<0.01$ at 24 hr, $p<0.005$ at 48 hr) and induration ($p<0.02$ at 48 hr) after 6 weeks' therapy. In contrast, the intensity of delayed hypersensitivity reactions at 6 weeks was not increased in eight control patients who did not receive cimetidine. These studies indicate that therapy with an H_2-receptor antagonist may be associated with an augmentation of delayed hypersensitivity responses.

5474 TREATMENT OF DUODENAL AND GASTRIC ULCERS WITH CIMETIDINE: A MULTICENTER DOUBLE-BLIND TRIAL. (Fre.)

Lambert, R.; Bader, J. P.; Bernier, J.; Bertrand, J.; Betourne, C.; Gastard, J.; *et al.* (Hopital E.-Herriot, F 69374 Lyon Cedex 2, France). *Gastroenterol. Clin. Biol.* 1(11):855-860; 1977.

The efficacy of cimetidine (an H_2 histamine receptor antagonist) therapy was tested in 49 patients with gastric ulcer and 140 patients with duodenal ulcer. Cimetidine was administered daily (200 mg after each meal and 400 mg at bedtime, p.o.) for 28 days. The number of patients who were asymptomatic by day 14 or day 28 was not significantly different between cimetidine and placebo groups in the gastric ulcer patients ($0.05<p<0.06$) but was significantly different in the duodenal ulcer patients on day 28 ($p=0.01$). In patients with gastric ulcers, endoscopy revealed complete healing on day 28 in 17/24 of those on cimetidine but in only 9/25 patients taking placebos ($p<0.02$). For patients with duodenal ulcers, healing occurred by day 28 in 54/71 patients on cimetidine but in only 4/69 patients taking placebo ($p<0.04$). The patients on cimetidine also reported markedly less pain on day 28. Clinical tolerance was excellent, with no side-effects occurring, other than mild and transient elevations of the levels of serum creatinine and transaminases in the gastric ulcer patients. Preliminary results of long-term effects of cimetidine treatment show a reduction in the number of recurrences after healing but have not yet allowed firm conclusions as to the possible toxicity or tachyphylaxy associated with prolonged treatment.

5475 INHIBITORY EFFECT OF CIMETIDINE ON GASTRIC ACID SECRETION VAGALLY ACTIVATED BY PHYSIOLOGICAL MEANS IN DUODENAL ULCER PATIENTS. (Eng.) Schoon, I. M.; Olbe, L. (Sahlgren Hosp., Goteborg, Sweden). *Gut* 19(1):27-31; 1978.

The effect of cimetidine on acid secretion evoked by physiological vagal reflex stimulation was studied in 12 patients with duodenal ulcer. Vagal activation of gastric acid secretion by modified sham feeding in six patients produced a peak acid response amounting to 52% of the peak acid output after pentagastrin stimulation (PAO_{pg}). Cholinergic reflex stimulation of gastric acid secretion by fundic distention in the other six patients produced a peak acid response of 45% of PAO_{pg}. The i.v. infusion of cimetidine (100 mg/hr) markedly inhibited the acid sham feeding response (by 90-100%) and almost abolished the acid response to fundic distention. The results suggest that gastric acid secretion evoked by physiological vagal activation in man is profoundly inhibited by H_2-receptor blocking agents.

5476 EFFECT OF PROLONGED CIMETIDINE THERAPY ON GASTRIC ACID SECRETION IN MAN. (Eng.) Barbezat, G. O.; Bank, S. (Groote Schuur Hosp., Observatory, 7925, Cape Town, South Africa). *Gut* 19 (2):151-154; 1978.

The effect of cimetidine on gastric acid secretion was investigated in a double-blind trial in which 23 patients with endoscopically confirmed duodenal ulceration received cimetidine (300 mg q.i.d. in 6 patients or 400 mg q.i.d. in 10 patients) or placebo (7 patients) for 6 weeks. Before entry into the trial, pentagastrin (6 µg/kg/hr)-stimulated gastric acid secretion after a single p.o. dose of 300 or 400 mg cimetidine was lowered by 82.1 ± 3.1% and 81.0 ± 3.5%, resp., while no significant inhibition was recorded in the patients receiving placebo (8.8%). The same test repeated after 6 weeks of continuous treatment showed that the effect of the drug was maintained, the percentage inhibition of acid secretion being of the same order as in the first test. Long-term therapy with cimetidine seems justified as it remains a potent inhibitor of gastric acid secretion despite prolonged use, and as its administration is associated with significant healing of duodenal ulcers.

5477 PREVENTION BY BEDTIME CIMETIDINE OF DUODENAL-ULCER RELAPSE. (Eng.) Blackwood, W. S.; Maudgal, D. P.; Northfield, T. C. (St. James' Hosp., London, England). *Lancet* 1(8065):626-627; 1978.

Forty-five patients with healed duodenal ulcers completed a 6-month double-blind trial to compare the effects of cimetidine and placebo on the prevention of duodenal ulcer relapse. A single bedtime dose of cimetidine (800 mg) was given, and ulcer relapse was assessed endoscopically at regular intervals. At the end of the trial, 16 of the 21 cimetidine-treated patients remained ulcer-free compared with only 3 of the 24 placebo-treated patients ($p<0.0005$). No untoward effects of this treatment were observed. Duodenal ulcer relapse is prevented by maintenance therapy with a single bedtime dose of cimetidine.

5478 EFFECT OF PYLOROPLASTY ON GASTRIC EMPTYING: LONG TERM RESULTS AS OBTAINED WITH A LABELLED TEST MEAL 14-43 MONTHS AFTER OPERATION. (Eng.) Binswanger, R. O.; Aeberhard, P.; Walther, M.; Vock, P. (Inselspital, CH-3010 Berne, Switzerland). *Br. J. Surg.* 65(1):27-29; 1978.

To evaluate the long-term effects on gastric emptying of different operations, the mean gastric transit time (t) and the half-time of gastric emptying ($t_{1/2}$) of a labeled test meal were studied in 18 patients more than 1 yr after gastric surgery for peptic ulcer and compared with those in 18 healthy controls. Of the patients, six had undergone proximal gastric vagotomy alone (PGV), six had had proximal gastric vagotomy and pyloroplasty (PGVP), and in six truncal vagotomy and pyloroplasty (TVP) had been performed. The t and $t_{1/2}$ of patients with PGV alone did not differ significantly from the values of the control group. The t and $t_{1/2}$ in patients after PGVP and TVP, however, were significantly lower than in both controls ($p<0.0025$ for PGVP, $p<0.0005$ for TVP) and patients after PGV alone ($p<0.05$ for PGVP, $p<0.005$ for TVP). There was no statistically significant difference between the groups with PGVP and TVP. The results suggest that the lasting effects of vagotomy operations on gastric emptying are due to the drainage procedure rather than the vagotomy.

5479 SELECTION OF PATIENTS FOR BILE DIVERSION SURGERY: USE OF BILE ACID MEASUREMENT IN FASTING GASTRIC ASPIRATES. (Eng.) Hoare, A. M.; McLeish, A.; Thompson, H.; Alexander-Williams, J. (Queen Elizabeth Hosp., Birmingham, England). *Gut* 19(3):163-165; 1978.

The value of diverting bile from the stomach by a Roux-en-Y procedure was assessed in 18 patients with dyspepsia and vomiting following peptic ulcer surgery. Bile regurgitation and mild epigastric pain relieved by vomiting were abolished by the bile diversion. Measurements of bile acids in the fasting gastric aspirate were useful in predicting the outcome of surgery; good results were obtained when initially there was reflux into the stomach of more than 120 µmol/hr of bile acids. A wider group of patients than those selected in previous series may benefit from this operation, as good results can be obtained in patients with dyspepsia relieved by alkali and without achlorhydria or gastritis. Endoscopy was repeated 1 yr after Roux-en-Y operation. Erythema of the mucosa was improved, but gastritis did not improve.

5480 PRIMARY HYPERPARATHYROIDISM AND PEPTIC ULCER DISEASE. (Eng.) Linos, D. A.; van Heerden, J. A.; Abboud, C. F.; Edis, A. J. (Mayo Clinic, 200 First St., SW, Rochester, MN 55901). *Arch. Surg.* 113(4):384-386; 1978.

To determine whether primary hyperparathyroidism is related to peptic ulcer disease, 46 cases of concomitant primary hyperparathyroidism and peptic ulcer disease were evaluated. Among these patients, there was no sex preponderance. The pathologic findings at parathyroid surgery, as well as the features of peptic ulcer disease, were the same as in patients with primary hyperparathyroidism or with peptic ulcer disease alone. The ulcer symptoms of 58% of the patients with adequate follow-up improved after parathyroidectomy. Sixty-six percent of the patients who had active peptic ulcer disease at surgery improved as compared with only 44% of the patients who had complicated peptic ulcer disease. None of the factors studied (age, sex, serum calcium and serum parathyroid hormone levels, location and duration of ulcer) had any effect on the peptic ulcer symptoms after parathyroidectomy. These results and a critical review of the experimental and clinical literature suggest that the association between primary hyperparathyroidism and peptic ulcer disease is no more than coincidental.

5481 pH THRESHOLD FOR RELEASE OF SECRETIN IN NORMAL SUBJECTS AND IN PATIENTS WITH DUODENAL ULCER AND PATIENTS WITH CHRONIC PANCREATITIS. (Eng.) Fahrenkrug, J.; Schaffalitzky de Muckadell, O. B.; Rune, S. J. (Bispebjerg Hosp., Copenhagen, Denmark). *Scand. J. Gastroenterol.* 13(2):177-186; 1978.

The pH threshold of secretin release was examined in seven normal controls (C), nine duodenal ulcer (DU) patients, and four patients with chronic pancreatitis (CP) to determine whether this pH threshold is too low to allow a role for secretin in the normal postprandial neutralization in the duodenum. The duodenum was perfused with isotonic citrate buffers (pH 4, 3, 2, or 1) at an infusion rate of 52 ml/min for 20 min and a resting period of 20 min between infusions. Using ^{51}Cr-EDTA as a volume marker for the citrate buffers, the disappearance rate of acid from the duodenum was calculated from the difference in pH between the infused buffer and the aspirated duodenal contents. Venous blood samples were taken every 10 min for secretin determination by radioimmunoassay. The plasma secretin concentration was <3 pM at pH 4 and 3. Perfusion at pH 2 caused a small but statistically significant ($p<0.01$) increase in the secretin concentration to 4 pM, and it rose to 12 pM at pH 1; no significant difference was found between these three groups. The disappearance rate of acid from the duodenum was the same for the controls and the patients at pH 4 and 3, while it was significantly lower ($p<0.05$) at pH 2 and 1 in the patients with CP. In all groups, the disappearance rate rose with increasing acidity of the buffer. There were strong correlations between the disappearance rate of acid from the duodenum and the plasma secretin concentration in all groups ($r=0.88$ for C, $r=0.54$ for DU, and $r=0.87$ for CP). These results demonstrate that the pH threshold for secretin release is between pH 2 and 3, with no difference between normal subjects and patients with DU or CP.

5482 RESULTS OF SYMPTOMATIC FOLLOW-UP BASED UPON ENDOSCOPIC AND BIOPTIC CONTROLS 5 TO 10 YEARS AFTER BI AND BII-RESECTION [Abstract]. (Eng.) Kliems, G.; Paquet, K. J.; Miederer, S. E.; Kutz, K. (Surgical Clinic, Univ. Bonn, Venusberg, W. Germany). *Endoscopy* 9(2):116; 1977.

5483 DOES ASPIRIN PRECIPITATE MAJOR GASTRO-INTESTINAL BLEEDING IN PATIENTS ON HAEMODIALYSIS [Letter to Editor]? (Eng.) Remuzzi, G.; Mingardi, G.; Mecca, G.; Donati, M. B.; De Gaetano, G. (Ospedali Riuniti, Bergamo, Italy). *Lancet* 2 (8033):359-360; 1977.

5484 "PLACEBO" RESPONSIVENESS OF PEPTIC ULCERS [Letter to Editor]. (Eng.) Eshelman, F.; Sanzari, N.; DeFelice, S.; Scheurer, U.; Halter, F.; Witzel, L.; *et al.* (Bio/Basics Internatl., 260 Madison Ave., New York, NY 10016). *Gastroenterology* 74(1):159-160; 1978.

5485 THE PATHOPHYSIOLOGY OF MALABSORPTION SYNDROME FOLLOWING GASTRIC OPERATION [Abstract]. (Eng.) Watanabe, Y.; Hayashida, Y. (Juntendo Univ. Sch. Medicine, Tokyo, Japan). *Gastroenterol. Jpn.* 12(4):322; 1977.

5486 PANCREATIC SECRETION IN DUODENAL ULCER PATIENTS TESTED BY HORMONAL STIMULATION [Abstract]. (Eng.) Dobrilla, G.; Filippini, M.; Valentini, M.; Abbondati, G. (Ospedale Regionale, 39100, Bolzano, Italy). *Ir. J. Med. Sci.* 146 (Suppl. 1):41; 1977.

5487 GASTRIC MUCUS VISCOSITY AND PEPTIC ULCER. (Eng.) Pringle, R. ("Balcairn," 434 Blackness Rd., Dundee DD2 1TQ, Scotland). *Adv. Exp. Med. Biol.* 89:227-237; 1977.

5488 ROLE OF VAGOTOMY IN DUODENAL ULCER. (Eng.) Donahue, P. E.; Marrie, A. J.; Krystosek, R. J.; Nyhus, L. M. (Univ. Illinois Abraham Lincoln Sch. Medicine, 840 S. Wood St., Chicago, IL 60680). *Postgrad. Med.* 62(4):156-160, 162, 165, 167; 1977.

5489 DEGLYCERRHIZINISED LIQUORICE IN DUODENAL ULCER. (Eng.) Larkworthy, W.; Holgate, P. F. L.; McIllmurray, M. B.; Langman, M. J. S.

(RAF Hosp., Nocton Hall, Lincoln, England). *Br. Med. J.* 2(6095):1123; 1977.

5490 ELECTROPHYSIOLOGICAL FINDINGS IN GASTRECTOMIZED PATIENTS WITH LOW SERUM B_{12}. (Eng.) Roos, D. (Rigshospitalet, Univ. Copenhagen, Copenhagen, Denmark). *Acta Neurol. Scand.* 56(3): 247-255; 1977.

5491 TREATMENT OF DUODENAL ULCERS WITH CIMETIDINE. (Eng.) Moshal, M. G.; Spitaels, J. M.; Bhoola, R. (Univ. Natal Medical Sch., P.O. Box 17039, Congella, 4013 South Africa). *S. Afr. Med. J.* 52(19):760-763; 1977.

5492 CURRENT MEDICAL MANAGEMENT OF DUODENAL ULCER DISEASE. (Eng.) Badley, B. W. D. (Victoria General Hosp., Halifax B3H 2Y9, Nova Scotia, Canada). *Can. Med. Assoc. J.* 117(10): 1192-1195; 1977.

5493 ON A NEW PREPARATION FOR CONTROLLING GASTRIC HYPERACIDITY. (Eng.) Lanfranchi, G. A.; Sciutti, R. (Second Clinic General Medicine and Therapeutics, Univ. Bologna, Bologna, Italy). *Panminerva Med.* 18(7/8):235-241; 1976.

5494 PERFORATED DUODENAL ULCER IN THE BLACK POPULATION OF CENTRAL JOHANNESBURG. (Eng.) Cooke, S. A. R. (Dept. Surgery, Univ. Witwatersrand, Hospital St., Johannesburg 2001, South Africa). *Br. J. Surg.* 64(11):791-794; 1977.

5495 ESTIMATION OF SERUM ACID PROTEASES AT pH 1.8 AND pH 3.5 IN PATIENTS WITH DUODENAL ULCER, GASTRIC ULCER AND GASTRIC CARCINOMA. (Eng.) Misaki, F.; Miyaoka, T.; Kimoto, K.; Sasaki, Z.; Kawai, K. (Kyoto Prefectural Univ. Medicine, Kawaramachi-Hirokoji, Kamigyo-ku, Kyoto 602, Japan). *Gastroenterol. Jpn.* 12(3):202-208; 1977.

5496 MAXIMUM ACID OUTPUT TO GRADED DOSES OF PENTAGASTRIN AND ITS RELATION TO PARIETAL CELL MASS IN CHINESE PATIENTS WITH DUODENAL ULCER. (Eng.) Cheng, F. C. Y.; Lam, S. K.; Ong, G. B. (Dept. Surgery and Medicine, Univ. Hong Kong, Hong Kong). *Gut* 18(10):827-832; 1977.

5497 THE EFFECTS OF HIGHLY SELECTIVE VAGOTOMY ON SECRETIN AND EMPTYING OF THE STOMACH. (Eng.) Geurts, W. J. C.; Winckers, E. K. A.; Wittebol, P. (Univ. Hosp., Utrecht, Netherlands). *Surg. Gynecol. Obstet.* 745(6):826-836; 1977.

5498 PARIETAL CELL VAGOTOMY FOR DUODENAL ULCER. (Eng.) Amdrup, E.; Parmeggiani, A. (Aarhus Kommunehospital, Aarhus, Denmark). *Rend. Gastroenterol.* 9(2):137-141; 1977.

5499 HYDROTALCITE IN THE TREATMENT OF BILE VOMITING. (Eng.) Hoare, A. M.; McLeish, A.; Thompson, H.; Alexander-Williams, J. (Queen Elizabeth Hosp., Birmingham, England). *Br. J. Surg.* 64(12):849-850; 1977.

5500 EFFECT OF A NEW GASTRIC ANTISECRETORY COMPOUND, TRITHIOZINE, ON PANCREATIC SECRETION IN CONTROL SUBJECTS AND PATIENTS AFFECTED BY DUODENAL ULCER. (Eng.) Dobrilla, G.; Filippini, M.; Valentini, M.; Abbondati, G.; Albrici, A. (Ospedale Generale Regionale di Bolzano, I 39 100 Bolzano, Italy). *Acta Ther.* 3(3):247-255; 1977.

5501 PNEUMOPERITONEUM IN PERFORATED DUODENAL ULCER DISEASE--A FURTHER LOOK. (Eng.) Lee, P. W. R.; Costen, P. D. M.; Wilson, D. H.; Halsall, A. K. (General Infirmary, Leeds 1, Yorkshire, England). *Br. J. Clin. Pract.* 31(7/8):108, 110; 1977.

5502 DRUGS FOR DUODENAL ULCER. (Eng.) Anonymous. (No affiliation given). *Lancet* 2(8046):1012-1013; 1977.

5503 PEPTIC ULCERATION OF THE LEFT ATRIUM. (Eng.) Scott, A.; Garland, C.; Gillespie, G. (Victoria Infirmary, Glasgow, Scotland). *J. R. Coll. Surg. Edinb.* 22(5):331-332; 1977.

See also, 5076, 5127, 5343, 5354, 5391, 5397, 5407, 5410, 5419, 5429, 5434, 5435, 5453, 5457, 5458, 5459, 5465, 5522, 5623, 5744, 5773, 5775, 5781, 5782.

SMALL INTESTINE

5504 RADIONUCLIDE IMAGING OF MECKEL'S DIVERTICULUM IN CHILDREN. (Eng.) Gelfand, M. J.; Silberstein, E. B.; Cox, J. (Cincinnati General Hosp., Cincinnati, OH 45267). *Clin. Nucl. Med.* 3(1):4-8; 1978.

Experience with radionuclide imaging in the diagnosis of Meckel's diverticulum is presented. Fifty-eight children were studied for the presence of Meckel's diverticulum by scintigraphy with ^{99m}Tc-pertechnetate. Meckel's diverticulum was found at surgery in all of 6 patients with positive radionuclide studies and in 2 of 48 patients with negative studies. Four studies could not be interpreted because of widespread intestinal activity. False-positive readings did not occur. Radionuclide imaging with sodium pertechnetate has proved valuable in the diagnosis of Meckel's diverticulum.

5505 SELECTIVE IgA DEFICIENCY ASSOCIATED WITH TOTAL VILLOUS ATROPHY OF THE SMALL INTESTINE AND AN ORGAN-SPECIFIC ANTI-EPITHELIAL CELL ANTIBODY.

(Eng.) McCarthy, D. M.; Katz, S. I.; Gazze, L.; Waldmann, T. A.; Nelson, D. L.; Strober, W. (Natl. Cancer Inst., Bethesda, MD 20014). *J. Immunol.* 120(3):932-938; 1978.

The case of a patient with total villous atrophy of the small intestine, associated with selective IgA deficiency, is presented. The patient, a 14-yr-old boy, presented after an acute febrile illness. A gluten-free diet and other standard treatments were without benefit. Studies revealed that T cell function, serum antibody production, delayed hypersensitivity, mixed leukocyte reaction, antibody-dependent and cell-mediated cellular cytotoxicities, and general immune responsiveness seemed intact. However, IgA could not be detected in serum, tissues, or external secretions and, cultured with pokeweed mitogen, the patient's B cells failed to produce IgA. In addition, the patient's cells suppressed IgA production by control cells cocultured in the presence of mitogen. Indirect immunofluorescent studies revealed in his serum an IgG class organ-specific antibody that bound to villus cells in control intestine, obtained from normal and diseased subjects, but not to cells in the patient's diseased mucosa. After low dose cyclophosphamide therapy, IgA remained absent but suppressor activity disappeared, intestinal villi regenerated fully, cellular cytotoxicity was reduced, and the serum antibody titer slowly declined. The antibody bound strikingly to mature cells in the patient's regenerated villi, on indirect but not direct immunofluorescence. These unique findings suggest an autoimmune etiology. No such antibodies were found in other IgA-deficient subjects.

5506 CHARACTERIZATION OF THE IgA IMMUNOCYTE POPULATION AND ITS PRODUCT IN A PATIENT WITH EXCESSIVE INTESTINAL FORMATION OF IgA.

(Eng.) Brandtzaeg, P.; Baklien, K. (Rikshospitalet, Oslo 1, Norway). *Clin. Exp. Immunol.* 30(1):77-88; 1977.

The case of an 11-yr-old boy with the clinical features of α-chain disease, but whose intestinal immunocytes produced a high level of IgA, is presented. His cell population and IgA production were studied extensively. The patient presented with features indicative of celiac or α-chain disease (growth retardation and malabsorption). However, his major serum component (about 50 mg/ml) was found to be a polyclonal, polymeric (about 80% dimeric) IgA consisting mainly of the subclass IgA_1 and showing a $\kappa:\lambda$ ratio of 67:33. Also, the serum concentration of IgA monomers was increased (to about 9 mg/ml). The polymers were heterogeneous with regard to J-chain content--varying on a molar basis from 1.9 for the more basic fraction to at least 2.4 for the more acidic one. Both fractions showed noncovalent affinity for secretory component (SC) *in vitro*. Most of the serum IgA seemed to originate from the small intestine, which contained a fivefold increased population of IgA immunocytes. These cells were heterogeneous with regard to production of polymeric IgA; many of them showed definitely more J-chain synthesis than did normal intestinal IgA immunocytes. The cell population had apparently not spread to the bone marrow, but the polymeric IgA product permeated the connective tissue throughout the body and appeared also in the urine, partly associated with SC. Such an excessively proliferating intestinal B-cell population may bear some relation to α-chain disease.

5507 NON-OCCLUSIVE INTESTINAL INFARCTION.

(Eng.) Watt-Boolsen, S. (Glostrup Hosp., Copenhagen, Denmark). *Acta Chir. Scand.* 143(6):365-369; 1977.

The frequency, outcome, and conditions associated with nonocclusive intestinal infarction were studied retrospectively in 23 patients. In 15 patients, the infarction was associated with cardiac disease and its treatment. In two patients it was associated with septic and hemorrhagic shock, and in four patients with other diseases. Two patients were healthy, when the symptoms of obstruction began. The course was fatal in 20 patients. It is concluded that nonocclusive intestinal infarction occurs often enough to be taken into consideration whenever nonmechanical intestinal infarction is suspected. The treatment should be directed to the conditions causing intestinal ischemia.

5508 HEPATIC COLLAGEN PROLINE HYDROXYLASE ACTIVITY IN HEPATIC DISEASE FOLLOWING JEJUNOILEAL BYPASS FOR MORBID OBESITY.

(Eng.) Mezey, E.; Imbembo, A. L. (Baltimore City Hosp., 4940 Eastern Ave., Baltimore, MD 21224). *Surgery* 83(3):345-353; 1978.

The hepatic activity of collagen proline hydroxylase was determined in the operative and follow-up liver biopsies of patients who underwent jejunoileal bypass for morbid obesity to determine whether changes in the activity of this enzyme correlate with and/or are of predictive value in the development of hepatocellular necrosis and fibrosis. The mean enzyme activity in the operative biopsies of 14 patients was 90.3 ± 28.51 disintegrations/min (dpm)/mg protein/min, which was similar to the activity of 80.0 ± 13.01 dpm/mg of protein/min found in the percutaneous liver biopsies of 12 nonobese controls. Hepatocellular necrosis developed in 3 of the 10 patients followed after jejunoileal bypass. The necrosis was indistinguishable from alcoholic hepatitis in two and focal in one. The hepatic activity of collagen proline hydroxylase increased to a value higher than the mean normal value plus 2 standard deviations (>170 dpm/mg of protein/min) only in the three patients who developed hepatocellular necrosis. Takedown of the bypass in the two patients with the histological picture resembling alcoholic hepatitis resulted in disappearance of the necrosis and in a fall in the enzyme activity to the normal range. The patient with focal necrosis was not operated on but was followed and developed hepatic failure rather suddenly and died. This study shows that increases in the activity of hepatic collagen proline hydroxylase following jejunoileal bypass occur in association with hepatocellular necrosis and indicate severe liver damage, regardless of how mild or severe the hepatocellular necrosis appears to be on histological examination.

5509 BACTERIAL FLORA OF THE SMALL BOWEL BEFORE AND AFTER BYPASS PROCEDURE FOR MORBID OBESITY. (Eng.) Corrodi, P.; Wideman, P. A.; Sutter, V. L.; Drenick, E. J.; Passaro, E., Jr.; Finegold, S. M. (Kantonsspital, CH-8091 Zurich, Switzerland). *J. Infect. Dis.* 137(1):1-6; 1978.

The contents of the proximal jejunum and distal ileum were cultured quantitatively in eight patients who were undergoing intestinal bypass procedure for obesity to determine whether bacterial colonization plays a role in the pathogenesis of side-effects seen after this type of surgery. Five jejunal specimens were sterile, and three contained low counts of a predominantly aerobic flora. Ileal contents yielded variable but usually higher counts than in the jejunum, and there were similar numbers of anaerobes and aerobes. In three patients in whom a bypass was established, contents of the functioning small bowel showed counts of $10^{5.0}$-$10^{7.6}$ colony-forming U/ml. These counts exceeded the counts in the normal terminal ileum, and the flora qualitatively resembled that of feces. Four specimens from excluded loops revealed colonization with fecal organisms, and the counts ranged between $10^{6.4}$ and $10^{9.7}$ colony-forming U/ml. In jejunoileal bypass, both the functioning small bowel and the excluded loop become colonized with colonic flora, a phenomenon that may contribute to some of the side-effects of this procedure.

5510 ZINC AND COPPER STATUS IN YOUNG PATIENTS FOLLOWING JEJUNOILEAL BYPASS. (Eng.) Faber, J.; Randolph, J. G.; Ribbins, S.; Smith, J. C. (Dept. Surgery, George Washington Univ., Washington, DC). *J. Surg. Res.* 24(2):83-86; 1978.

To determine whether zinc and copper malabsorption occurs after jejunoileal bypass, zinc and copper nutrition was investigated in eight young subjects (aged 11-19 yr) at the time of surgery. This study was performed an average of 30 months following the operations. Weight loss averaged 43%. However, all patients had stabilized in weight prior to the study, and supplementary potassium or calcium was no longer required. Except for one patient who had the Prader-Willi syndrome, all were free of medical problems other than obesity. Six of the eight subjects had low serum zinc concentrations. In addition, five of the eight had subnormal serum copper concentrations. The data suggest apparent malabsorption of zinc and copper resulting in depressed serum concentrations of these trace elements. Therefore, supplementation may be beneficial, especially if the operation is performed on children before the completion of growth and sexual maturation.

5511 DUPLICATION CYST OF THE DUODENUM IN THE ADULT. (Eng.) Taura, M.; Taura, S.; Yasuda, M.; Hirai, T. (Burnsides Res. Lab., Univ. Illinois at Urbana-Champaign, Urbana, IL 61801). *Gastroenterol. Jpn.* 12(4):311-316; 1977.

5512 ULTRASOUND DIAGNOSIS OF INTRAMURAL INTESTINAL HEMATOMA. (Eng.) Lee, T. G.; Brickman, F. E.; Avecilla, L. S. (Univ. Oregon Health Sciences Center, 3181 S.W. Sam Jackson Park Rd., Portland, OR 97201). *J. Clin. Ultrasound* 5(6):423-424; 1977.

5513 MIDGUT ROTATION: IS THE PROCESS INITIATED BY THE DUODENUM? (Eng.) Lister, J. (Dept. Pediatric Surgery, Univ. Liverpool, Eaton Rd., Liverpool, L12 2AP, England). *Z. Kinderchir.* 22(3):254-260; 1977.

5514 THE PRESENT STATE OF SMALL BOWEL TRANSPLANTATION IN ANIMAL RESEARCH AND IN MAN. (Eng.) Stauffer, U. G. (Universitats-Kinderklinik, Zurich, Switzerland). *Z. Kinderchir.* 22(3):241-248; 1977.

5515 ULCERATIVE PSEUDOPOLYPOSIS MIMICKING NEOPLASM PROXIMAL TO A JEJUNAL OBSTRUCTION. (Eng.) Eisenberg, R. L.; Hedgcock, M. W.; Jeffrey, R. B.; Montgomery, C. K. (Veterans Admin. Hosp., 4150 Clement St., San Francisco, CA 94121). *Am. J. Roentgenol.* 129(3):503-505; 1977.

5516 BLEEDING ILEAL VARICOSITY DEMONSTRATED BY TRANSHEPATIC PORTOGRAPHY. (Eng.) Kinkhabwala, M.; Mousavi, A.; Iyer, S.; Adamsons, R. (New York Medical Coll.-Metropolitan Hosp. Center, 106th St. and Fifth Ave., New York, NY 10029). *Am. J. Roentgenol.* 129(3):514-516; 1977.

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5518 THE RELATION BETWEEN ILEAL RESECTION AND VITAMIN B_{12} ABSORPTION. (Eng.) Thompson, W. G.; Wrathell, E. (Ottawa Civic Hosp., 1053 Carling Ave., Ottawa, Ontario K1Y 4E9, Canada). *Can. J. Surg.* 20(5):461-464; 1977.

5519 DIAMOND-SHAPED ANASTOMOSIS FOR CONGENITAL DUODENAL OBSTRUCTION. (Eng.) Kimura, K.; Tsugawa, C.; Ogawa, K.; Matsumoto, Y.; Yamamoto, T.;

Asada, S. (Kobe Children's Hosp., 1-1-1, Takakuradai, Samaku, Kobe 654, Japan). *Arch. Surg.* 112(10):1262-1263; 1977.

5520 ONSET OF TUBERCULOSIS AFTER INTESTINAL BYPASS SURGERY FOR OBESITY: GUIDELINES FOR EVALUATION, DRUG PROPHYLAXIS, AND TREATMENT. (Eng.) Yu, V. L. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Arch. Surg.* 112(10):1235-1237; 1977.

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5522 POSTGASTRECTOMY AFFERENT LOOP OBSTRUCTION DUE TO EFFERENT LOOP HERNIATION. (Eng.) Hakami, M.; Ahmadzadeh, M.; Hakami, F. (Univ. Isfahan, Sch. Medicine, Isfahan, Iran). *Abdom. Surg.* 19(9):202-203; 1977.

5523 INVESTIGATION OF RESERVE FUNCTIONAL ABILITY OF SMALL INTESTINE BY XYLOSE TEST AFTER FOOD LOADING. (Eng.) Frolkis, A. V.; Bushkova, R. (Dept. Internal Medicine, Kuusinen Univ., Petrozavodsk, Lenina 33, USSR). *Acta Hepatogastroenterol. (Stuttg.)* 24(4):266-270; 1977.

5524 PNEUMATOSIS INTESTINALIS AS A COMPLICATION OF JEJUNOILEAL BYPASS. (Eng.) Wandtke, J.; Skucas, J.; Spataro, R.; Bruneau, R. J. (Rochester General Hosp., Rochester, NY 14642). *Am. J. Roentgenol.* 129(4):601-604; 1977.

5525 CAVITATING METASTASES OF THE SMALL INTESTINE. (Eng.) Zornoza, J.; Goldstein, H. M. (M.D. Anderson Hosp. and Tumor Inst., Houston, TX 77030). *Am. J. Roentgenol.* 129(4):613-615; 1977.

5526 LACTIC DEHYDROGENASE ISOENZYMES IN THE GASTRIC AND COLONIC MUCOSA: THEIR CLINICAL RELEVANCE. (Spa.) Carda Abella, P. (Facultad de Medicina, Universidad Complutense, Madrid, Spain). *Rev. Esp. Oncol.* 23(1):13-82; 1976.

5527 SMALL INTESTINE NEOPLASMS. (Pol.) Ancyparowicz, S.; Piotrowicz, W.; Kawalski, A. (Klinika Chirurgii Ogolnej CMKP, ul. Czerniakowska 231, 00-416 Warsaw, Poland). *Pol. Tyg. Lek.* 33(2):53-55; 1978.

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5533 EVALUATION OF INTESTINAL BYPASS SURGERY FOR THE TREATMENT OF OBESITY. (Spa.) Rodriguez Montes, J. A.; Fernandez de Lis, S. (Ciudad Sanitaria "La Paz," Universidad Autonoma de Madrid, Madrid, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(4):465-480; 1977.

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5535 USE OF OBLIQUE SMALL BOWEL FISTULA IN PARALYTIC ILEUS. (Ger.) Wedell, J.; Richter, Th. (Kreiskrankenhaus, Schwarzenmoorstrasse 70, D-4900 Herford, W. Germany). *Chirurg* 48(5): 339-342; 1977.

5536 MECHANICAL OBSTRUCTION OF THE SMALL INTESTINE: REPORT OF 117 CASES. (Spa.) Mendoza, C. G.; Guerrero, J. A.; Magallo, J. A.; Camprodon, R. (Ciudad Sanitaria "Francisco Franco," de la Seguridad Social, Barcelona, Spain). *Rev. Esp. Enferm. Apar. Dig.* 51(4):391-404; 1977.

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J. (Eeuwfeestkliniek en St. Vincentiusziekenhuis, Antwerp, Belgium). *Tijdschr. Gastroenterol.* 20(1): 5-28; 1977.

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5539 RULES OF INTERPRETATION OF DOUBLE-CONTRAST COLONIC RADIOLOGY: DIAGNOSIS OF POLYPS. (Fre.) Weissman, A.; Clot, M.; Grellet, J. (Hopital de la Pitie, 83, boulevard de l'Hopital, F 75013 Paris, France). *Gastroenterol. Clin. Biol.* 1(3): 281-296; 1977.

5540 EXTENDED RESECTION OF THE STOMACH AND SMALL INTESTINE IN DUODENAL AND JEJUNAL POLYPOSIS. (Ger.) Pfitzmann, K. F. (Stadtisches Klinikum Berlin-Buch, II. Chirurgische Klinik, Zepernicker Strasse 1, DDR-1115 Berlin-Buch, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(2): 79-83; 1977.

5541 PERSISTING DUODENAL SEPTUM IN ADULTS. (Ger.) Helwing, E.; Echtermeyer, V.; Otten, G. (Klinik fur Allgemeinchirurgie, Medizinische Hochschule Hannover, Pasteurallee, D-3000 Hannover, W. Germany). *Chirurg* 48(2):85-87; 1977.

5542 POSTOPERATIVE PARESIS OF THE SMALL INTESTINE. (Pol.) Kurzbauer, R. (Oddzial Chirurgiczny Zespol Opieki Zdrowotnej w Prudniku, Prudnik, Poland). *Pol. Przegl. Chir.* 49(8):791-795; 1977.

See also, 5090, 5091, 5135, 5137, 5233, 5239, 5290, 5291, 5294, 5300, 5327, 5334, 5354, 5357, 5397, 5401, 5407, 5415, 5418, 5421, 5437, 5459, 5471, 5482, 5483, 5551, 5557, 5560, 5565, 5600, 5670, 5753, 5780, 5788, 5789, 5790, 5791, 5792, 5795, 5799, 5800, 5805, 5807, 5817, 5825, 5826.

SMALL INTESTINE

Malabsorption

5543 UNTREATED ACRODERMATITIS ENTEROPATHICA IN ADULTS. (Eng.) Olholm-Larsen, P. (Univ. Hosp., Odense, Denmark). *Dermatologica* 156 (3):155-166; 1978.

Six cases of untreated acrodermatitis enteropathica (AE) in surviving adults are reviewed from the literature and two additional cases are reported. In three of the cases from the literature, the symptoms disappeared at the onset of puberty, while in the rest, the disease had a fluctuating course with long symptom-free intervals and an uncharacteristic symptomatology. The two new cases are a brother and sister from a nonconsanguineous marriage, both with mild manifestations of AE. In the brother, only characteristic skin changes on the feet remained at adult age. His sister had both skin and intestinal symptoms that disappeared at adult age, but the skin manifestations reappeared with each pregnancy. The woman suffered from depression for long periods and developed signs of parkinsonism at a relatively young age (40 yr). Both patients had very low serum zinc levels, and complete remission of symptoms was effected by zinc sulfate administration, confirming that AE is a zinc deficiency syndrome. The parents and another brother had slightly lowered serum zinc levels, consistent with a heterozygous genotype for the autosomal recessive allele for AE. AE in adults may be underdiagnosed because of an uncharacteristic symptomatology; determination of serum zinc levels is essential to such a diagnosis.

5544 T AND B LYMPHOCYTES IN ALPHA-CHAIN DISEASE. (Eng.) Kharazmi, A.; Rezai, M. H.; Abadi, P.; Nasr, K.; Haghighi, P.; Haghshenas, M. (Medical Sch., Pahlavi Univ., Shiraz, Iran). *Br. J. Cancer* 37(1):48-54; 1978.

The possibility that abnormalities of the immune system exist in alpha-chain disease was investigated in 9 patients and 10 controls. The rosette technique and surface immunofluorescence were used to enumerate the circulating thymus-derived (T) and bone marrow-derived (B) lymphocytes. The proportion of circulating B lymphocytes was much higher in the patients (34%-64%) than in controls (average 26.2%), whereas that of the T lymphocytes was lower in the patients than in the controls (32%-60% versus 57%-72%, average 64.5%). The patients could not be sensitized to dinitrochlorobenzene, and their skin test to tuberculin was negative. Although the IgM and IgG levels in the patients were similar to those in controls, the IgA level was elevated in the patients compared with the controls (130-534 mg/100 ml, versus 122-298, average 199.5 mg/100 ml). It is concluded that alpha-chain disease is a B cell disease of the IgA type and is associated with a low level of cellular immunity.

5545 STRONG ASSOCIATION BETWEEN THE HLA-Dw3-RELATED B CELL ALLOANTIGEN -DRw3 AND COELIAC DISEASE. (Eng.) Ek, J.; Albrechtsen, D.;

Solheim, B. G.; Thorsby, E. (Natl. Hosp. Norway, Rikshospitalet, Oslo 1, Norway). *Scand. J. Gastroenterol.* 13(2):229-233; 1978.

To investigate the clinical value of B cell typing in patients with suspected celiac disease (CD), the frequency of histocompatibility locus antigens HLA-A, -B, -C, and -Dw3 and the associated B lymphocyte alloantigen -DRw3 was studied in 68 children with untreated CD and in healthy controls. Although no significant differences in the frequencies of other antigens between patients and controls were found, DRw3 occurred in a significantly greater number of patients than controls (95% versus 25%), and the relative risk was calculated to be 54. The high frequencies of HLA-A1, -B8, and -Dw3 in CD was confirmed. The high relative risk of CD that was associated with DRw3 suggests that B lymphocyte typing is valuable in the diagnosis of CD.

5546 IgA AND IgG RETICULIN ANTIBODIES IN COELIAC AND NON-COELIAC PATIENTS. (Eng.) Eade, O. E.; Lloyd, R. S.; Lang, C.; Wright, R. (Southampton Univ. Hosp., Southampton, England). *Gut* 18(12):991-993; 1977.

Using indirect immunofluorescence, comparisons were made of patterns of staining of five tissue substrates with 28 R1 reticulin antibody-positive celiac sera, and 23 R1 reticulin antibody-positive nonceliac sera. IgA and IgG fluorescein conjugates were used separately. IgA antibodies were seen in 22 celiac patients compared with 3 nonceliac patients. Concomitant sinusoidal fluorescence (RS pattern) was seen more frequently with the nonceliac (60.9%) than with celiac sera (10.7%). Such differences may help to distinguish those patients who should have a jejunal biopsy when using the reticulin antibody as a screening test for celiac disease.

5547 COMPLEMENT SYSTEM STUDIES IN ADULT COELIAC DISEASE. (Eng.) Teisberg, P.; Fausa, O.; Baklien, K.; Akesson, I. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 12(7):873-876; 1977.

To clarify the mechanism of gluten damage to the intestinal mucosa in celiac disease, detailed complement system studies were carried out in 22 patients with adult celiac disease. Activation products of C3 were observed in the fresh sera of all untreated patients, while only four had activation products of factor B of the alternate pathway. C4 and C3 levels were lower than normal mean, but only the depression of C4 reached a level of statistical significance ($p<0.05$). The amounts of circulating C3 activation products were significantly reduced when the patients were on a gluten-free diet ($p<0.05$). The results suggest that activation of the classical pathway of the complement system takes place in adult celiac disease, and that there is an association between gluten ingestion and complement activity. A possible mechanism of tissue injury in this disease may be activation of complement factors by a humoral immune reaction to dietary gluten in the intestinal wall.

5548 ABSORPTION OF INORGANIC AND HAEMOGLOBIN IRON IN COELIAC DISEASE. (Eng.) Anand, B. S.; Callender, S. T.; Warner, G. T. (Radcliffe Infirmary, Oxford OX2 6HE, England). *Br. J. Haematol.* 37(3):409-414; 1977.

To clarify the nature of iron absorption and iron deficiency in celiac disease, absorption of a 5-mg dose of iron as Fe^{++} or hemoglobin iron was studied using a total body counter in 131 control, 34 untreated patients with celiac disease, and 33 patients with celiac disease on a gluten-free diet. In both patients and controls, the majority of subjects were iron deficient. Thirteen control subjects, 13 patients with untreated celiac disease, and 14 on a gluten-free diet had both absorption tests. Fe^{++} absorption was reduced in patients with untreated celiac disease who were not iron-deficient (8.0% versus 19.3 in treated celiac patients and 14.9% in controls) and in anemic celiac patients (18.7% in treated patients and 45.4% in controls). These results show that Fe^{++} absorption is affected by celiac disease and is improved by a gluten-free diet. Absorption was improved on treatment with gluten-free diet. In contrast, the absorption of hemoglobin iron was not affected in celiac disease, indicating that the absorption of iron in this form is not dependent on the integrity of the mucosa of the proximal small bowel.

5549 GLUTEN-FREE DIET IN DERMATITIS HERPETIFORMIS. II. MORPHOLOGICAL AND IMMUNOLOGICAL FINDINGS IN THE SKIN AND SMALL INTESTINE OF 12 PATIENTS AND MATCHED CONTROLS. (Eng.) Reunala, T. (Univ. Central Hosp., Snellmaninkatu 14, SF-00170 Helsinki 17, Finland). *Br. J. Dermatol.* 98(1):69-78; 1978.

To assess the importance of immunological factors in dermatitis herpetiformis, the skin and small intestine of 12 patients with dermatitis herpetiformis whose skin condition responded to a gluten-free diet (GFD) were re-examined morphologically and immunologically after diet treatment. The findings were compared with those in 12 matched patients on a normal diet. Jejunal histology revealed morphological improvement in every patient on a GFD, whereas all patients on a normal diet continued to have villous atrophy. Intraepithelial lymphocyte counts were normal in eight patients on a GFD in contrast to one on a normal diet. Immunofluorescence examination of the jejunal mucosa revealed that the numbers of cells containing IgA and IgM were increased significantly in the normal diet group ($p<0.001$ for IgA, $p<0.05$ for IgM). The values were lower in the GFD group but these also exceeded the values in the controls. IgA deposits were found in the uninvolved skin of every patient irrespective of the diet treatment, but the fluorescence seemed to be less intense in patients on a GFD. A clear difference was found in the occurrence of complement component C_3 deposits in the uninvolve skin. Three patients on a GFD had C_3 deposits; two of these did not follow a strict diet. However, C_3 was found in eight patients on a normal diet. Circulating dietary and autoantibodies were found in two patients on a GFD and in nine on a normal diet. Serum immunoglobulin (IgG, IgA, IgM) and complement (C_3, C_4) levels were within normal limits in both patient groups.

5550 ANTIBODIES TO GLUTEN AND RETICULIN IN GASTROINTESTINAL DISEASES. (Eng.) Eterman, K.P.; Feltkamp, T. E. W. (Netherlands Red Cross Blood Transfusion Service, P.O. Box 9190, Amsterdam, Netherlands). *Clin. Exp. Immunol.* 31(1):92-99; 1978.

Frequencies and immunoglobulin classes of antibodies to reticulin (Rab) and to gluten (Gab) in relation to the diet were studied in patients with celiac disease, dermatitis herpetiformis, Crohn's disease, ulcerative colitis, cystic fibrosis, and miscellaneous diseases leading to recurrent diarrhea. In addition, the sera of some celiac patients and of patients with dermatitis herpetiformis were examined for the presence of autoantibodies to smooth muscle, skeletal muscle, thyroid, gastric parietal cells, adrenocortex, salivary duct cells, nuclei, and mitochondria. Rab were found in 33% of 14 celiac patients on a normal diet. These antibodies were found in only 10% of six celiac patients on a gluten-free diet. In 34 patients with dermatitis herpetiformis, 12% had these antibodies, whereas the highest frequency in the other diseases studied was 7% (compared to 2% in healthy controls). Antibodies to gluten, demonstrated with the immunofluorescence technique, were found in all celiac children on a normal diet that were studied, and in half of the adults with the untreated disease. In children and adults on a gluten-free diet, these frequencies decreased to 87% amd 32%, resp. In Crohn's disease, cystic fibrosis, recurrent diarrhea, dermatitis herpetiformis, and ulcerative colitis, the frequencies were 52%, 42%, 37%, 18%, and 18%, resp. (compared with 4% in controls). It is concluded that Gab are sensitive markers for gastrointestinal diseases, but are not specific for gluten enteropathy. Rab, on the other hand, are less sensitive but of far greater specificity for celiac disease. Gab were of the IgA, IgM, and IgG classes, whereas Rab were only of the IgA and IgG classes. Both types of antibody were found to be noncomplement-fixing. Autoantibodies to smooth muscle were found in 5% of the celiac patients compared with 0% of controls. No relationship with hepatic complications was found. In the patients with dermatitis herpetiformis, autoantibodies to gastric parietal cells were found in 24% compared with 5% of controls. No relationship was established between the occurrence of histocompatibility locus antigen B8 and the presence or absence of any of the antibodies studied.

5551 INTESTINAL FUNCTION IN INFANTS WITH SEVERE CONGENITAL HEART DISEASE. (Eng.) Sondheimer, J. M.; Hamilton, J. R. (Hosp. for Sick Children, 555 University Ave., Toronto, Ontario M5G 1X8, Canada). *J. Pediatr.* 94(2):572-578; 1978.

Digestive tract function was evaluated in 21 young infants with severe congenital heart disease. Nine infants had congestive heart failure and ventricular septal defect or single ventricle, and the others had cyanosis and transposition of the great arteries. Enteric protein loss was excessive in eight patients, and steatorrhea was found in five. These abnormalities were mild and not related to the type or severity of the cardiac lesion. This study suggests that, in designing dietary regimens for these patients, their potential for defective gastrointestinal function must be considered. Because no consistent pattern of abnormalities is apparent, each patient who fails to thrive may deserve gastroenterologic evaluation.

5552 EVIDENCE FOR EXCESSIVE ABSORPTION OF OXALATE BY THE COLON IN ENTERIC HYPEROXALURIA. (Eng.) Modigliani, R.; Labayle, D.; Aymes, C.; Denvil, R. (Hopital Saint Lazare, 107 rue de Faubourg St. Denis 75010 Paris, France). *Scand. J. Gastroenterol.* 13(2):187-192; 1978.

The site of oxalate hyperabsorption in malabsorption syndromes and the role of the colon in enteric hyperoxaluria were investigated in 27 patients with steatorrhea secondary to ileal resection (IR) and in 38 controls. The mean urinary oxalate excretion was high in 13 patients with IR and intact colon and in 9 subjects with IR and right hemicolectomy (90.2 ± 11.9 and 108 ± 18.6 mg/24 hr, resp.), whereas it was normal in 5 patients with IR and ileostomy (21.9 ± 4.4 mg/24 hr). In one patient in the last group in whom the colon had not been removed initially but excluded, closure of the ileostomy resulted in the development of frank hyperoxaluria. Intracolonic perfusion of calcium (1.93 g/day) abolished or greatly reduced the hyperoxaluria in three patients. These results indicate that the colon is the major site of oxalate hyperabsorption, and that the right colon is not necessary for the development of hyperoxaluria in malabsorption syndromes.

5553 RESPIRATORY HYDROGEN EXCRETION AS A PARAMETER FOR LACTOSE MALABSORPTION IN CHILDREN. (Eng.) Fernandes, J.; Vos, C. E.; Douwes, A. C.; Slotema, E.; Degenhart, H. J. (Erasmus Univ. Sophia Children's Hosp., Gordelweg 160, Rotterdam, Netherlands). *Am. J. Clin. Nutr.* 31(4):597-602; 1978.

Respiratory hydrogen excretion as a parameter of lactose malabsorption was investigated during tolerance tests with lactose, glucose plus galactose, and skim milk in 52 children, 4 to 15 yr of age. Ten children appeared to be lactose malabsorbers, as reflected by increased respiratory hydrogen excretion after the administration of lactose (2 g/kg, maximum 50 g). Skim milk, equivalent to 0.5 g lactose/kg, was administered to all lactose malabsorbers. Eight children were tolerant and two children were "intolerant" for this physiological amount of lactose when administered as skim milk. Disaccharidase activities of jejunal biopsies were determined in all 10 children with lactose malabsorption. Lactase activity was deficient in nine children and normal in one child. The increase of blood glucose during the lactose tolerance test reflected lactose malabsorption less accurately than did the respiratory hydrogen excretion.

5554 SPECIFIC ANTIBODIES IN INFANTS WITH GASTROINTESTINAL INTOLERANCE TO COW'S MILK PROTEIN. (Eng.) Fallstrom, S. P.; Ahlstedt, S.; Hanson, L. A. (Inst. Medical Microbiology of the Univ., Guldhedsgatan 10, S-413 46 Goteborg, Sweden). *Int. Arch. Allergy Appl. Immunol.* 56(2):97-105; 1978.

Antibodies of various immunoglobulin classes against cow's milk proteins were studied in 16 infants and children with cow's milk protein intolerance, 8 with gluten-sensitive enteropathy, and 7 with acute gastroenteritis. Their IgE, IgG, IgM, and IgA levels, determined with the enzyme-linked immunosorbent assay (ELISA), and their IgE antibodies, determined with the radioallergo-sorbent test, were compared with those of reference groups of children (n=15) and adults (n=5). IgE, IgG, or IgA antibodies against unseparated cow's milk proteins, α-lactalbumin, β-lactoglobulin, α-casein, and β-casein were present in many of the studied samples, but did not discriminate between the individuals with and without intolerance symptoms. As a group, the infants with late reactions to cow's milk showed increased levels of IgE and IgC antibodies detected with the ELISA ($p<0.05$), while patients with gluten-sensitive enteropathy had significantly increased levels of IgG and IgA antibodies to cow's milk proteins compared to the reference group ($p<0.05$). By combining the findings of antibody increases in various immunoglobulin classes, an individual discrimination could be reached. Thus, 8 or 9 of the patients with late reactions to cow's milk had increased levels of IgE or IgG plus IgA antibodies as compared to 3 of 22 in the reference or acute gastroenteritis groups. Serodiagnosis with the ELISA may, therefore, be of some use in patients with a suspicion of cow's milk protein intolerance.

5555 ASSOCIATION OF CONGENITAL HYPOALDOSTERONISM AND STEATORRHEA. (Fre.) Loeuille, G.; Razemon-Pinta, M.; Lefebvre, J.; Racadot, A.; Farriaux, J. P.; Fontaine, G. (CHU Lille, Cite Hospitaliere, 59000 Lille, France). *Sem. Hop. Paris* 53(33):665-672; 1977.

The case of a 7-month-old female infant with severe failure to thrive is presented. A family history revealed the consanguinity of the parents (first cousins) and the death of a sister at 9 months of similar symptoms. The child weighed 3,980 g (birth weight was 3,400 g); there was hepatomegaly, excessive sudation, and a severe, intermittent steatorrhea (daily stools were 1% of body weight). The blood and urine levels of aldosterone were very low, the deficiency probably involving 18-hydroxylase activity and leading to hyponatremia, hyperkalemia, and metabolic acidosis. A diet free of gluten, milk proteins, and lactose, and including substitution by medium chain triglycerides did not improve the patient's condition, but treatment with NaCl (2-3 g/day) and 9-alpha-fluorohydrocortisone resulted in a rapid weight gain (600 g/10 days) and normalization of the blood picture. The baby died suddenly, however, of a bronchopneumonia with high fever. The authors emphasize the vulnerability of infants with hypoaldosteronism to any stress and the unusual severity of this case, which was complicated by severe malabsorption.

5556 WHIPPLE'S DISEASE IN A FEMALE WITH IMPAIRED CELL-MEDIATED IMMUNITY UNRESPONSIVE TO CO-TRIMOXAZOLE AND LEVAMISOLE THERAPY. (Eng.) Haeney, M. R.; Ross, I. N. (East Birmingham Hosp., Bordesley Green East, Birmingham B9 5ST, England). *Postgrad. Med. J.* 54(627):45-50; 1978.

The case of a 54-yr-old woman with Whipple's disease and impaired cell-mediated immunity is presented. Malabsorption of iron, vitamin B_{12}, folic acid, and fat was present. These abnormalities reverted to normal after the introduction of co-trimoxazole therapy. The patient's humoral immune system was normal, in contrast to impairment of cell-mediated immunity, which has not improved in spite of co-trimoxazole treatment for 2 yr and a therapeutic trial of levamisole (150 mg x 2/week 2 months, followed by 150 mg/day for 2 months). These findings are further evidence that there may be a primary immune deficiency in patients with Whipple's disease.

5557 SMALL BOWEL FUNCTION IN LACTASE DEFICIENCY [Abstract]. (Eng.) Debongnie, J. C.; Newcomer, A. D.; Phillips, S. F. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 72(5, Part 2):1046; 1977.

5558 SERUM LIPIDS AND PROTEINS IN LACTOSE MALABSORPTION. (Eng.) Sahi, T.; Jussila, J.; Penttila, I. M.; Sarna, S.; Isokoski, M. (Harvard Sch. Public Health, 677 Huntington Ave., Boston, MA 02115). *Am. J. Clin. Nutr.* 30(4):476-481; 1977.

5559 ENURESIS TREATED WITH A MILK-FREE DIET [Abstract]. (Eng.) Tudor, R. B. (Quain and Ramstead Clinic, Bismarck, ND). *Gastroenterology* 72(5, Part 2):1142; 1977.

5560 INTESTINAL DISACCHARIDASE ACTIVITIES IN RELATION TO AGE [Abstract]. (Eng.) Welsh, J. D.; Poley, J. R.; Bhatia, M.; Stevenson, D. (Univ. Oklahoma Health Sciences Center, Oklahoma City, OK). *Gastroenterology* 72(5, Part 2):1148; 1977.

5561 PROTEIN-LOSING ENTEROPATHY COMPLICATING THE MUSTARD PROCEDURE. (Eng.) Krueger,

S. K.; Burney, D. W.; Ferlic, R. M. (Bishop Clarkson Memorial Hosp. Omaha, NB). *Surgery* 81(3):305-306; 1977.

5562 SERUM 25-HYDROXYVITAMIN D (25-OH-D) AND THE PATHOGENESIS OF OSTEOMALCIA IN PATIENTS WITH NON-TROPICAL SPRUE (NTS) [Abstract]. (Eng.) Arnaud, S. B.; Newcomer, A. D.; Hodgson, S. F.; Jowsey, J. O.; Go, V. L. W. (Mayo Clinic, Rochester, MN 55901). *Gastroenterology* 72(5, Part 2):1025; 1977.

5563 INTESTINAL CALCIUM BINDING PROTEIN (CaBP) IN NORMAL AND UREMIC MAN [Abstract]. (Eng.) Gleason, W. A.; Grimme, N.; Avioli, L. V.; Alpers, D. H. (Washington Univ. Sch. Medicine, St. Louis, MO). *Gastroenterology* 72(5, Part 2): 1063; 1977.

5564 A XYLOSE ABSORPTION TEST EMPLOYING BREATH ANALYSIS TECHNIQUES [Abstract]. (Eng.) Lahr, C. (Univ. Chicago, Pritzker Sch. Medicine, Chicago, IL). *Gastroenterology* 72(5, Part 2):1188; 1977.

5565 FOOD BOUND VITAMIN B_{12} MALABSORPTION--A CLINICALLY IMPORTANT CAUSE OF VITAMIN B_{12} DEFICIENCY [Abstract]. (Eng.) King, C.; Leibach, J.; Toskes, P. (Veterans Admin. Hosp., Gainesville, FL). *Gastroenterology* 72(5, Part 2):1080; 1977.

5566 WHIPPLE'S DISEASE. (Eng.) Leichtentritt, K. G. (Albert Einstein Coll. Medicine, New York, NY). *Am. J. Proctol.* 28(2):59-62; 1977.

See also, 5100, 5104, 5105, 5116, 5262, 5290, 5293, 5327, 5329, 5334, 5413, 5485, 5505, 5506, 5510, 5518, 5735, 5774, 5777.

LARGE INTESTINE

5567 DIAGNOSIS OF PSEUDOMEMBRANOUS COLITIS. (Eng.) Kappas, A.; Shinagawa, N.; Arabi, Y.; Thompson, H.; Burdon, D. W.; Dimock, F.; *et al.* (General Hosp., Birmingham, England). *Br. Med. J.* 1(611):675-678; 1978.

The clinical presentation and diagnostic features of pseudomembranous colitis are reviewed in 28 patients with histologically proved pseudomembranous colitis. All patients had received antibiotics, six for infections not requiring operations; the other cases all occurred after major surgery. All patients had diarrhea; six patients also had fever with clinical signs of sepsis, and three had abdominal pain thought to be due to anastomotic dehiscence after colonic resection. Pseudomembranous colitis was associated with WBC counts over 15,000 mm^3 in 17 patients and albumin concentrations of less than 30 g/l in 18. Pseudomembranous colitis was an incidental finding at necropsy in two of six patients who had not had an operation. Of the 22 patients who had had major surgery, 9 died from this complication; in all except two of these cases the diagnosis was made only at necropsy. If pseudomembranous colitis is suspected on clinical grounds or if there is an unexplained complication after colorectal surgery, repeat sigmoidoscopy and testing for fecal toxins should be carried out to establish the diagnosis.

5568 COLONIC HAUSTRAL PATTERN IN RELATION TO PRESSURE ACTIVITY AND PRESENCE OF DIVERTICULA. (Eng.) Weinreich, J.; Moller, S. H.; Andersen, D. (Dept. Surgical Gastroenterology, Aarhus Amtyssygehus, DK-8000 Aarhus C, Denmark). *Scand. J. Gastroenterol.* 12(7):857-864; 1977.

The correlation between the haustral pattern in the sigmoid colon and the pressure activity and presence of diverticula was examined in 184 patients with various colonic disorders (excluding major diseases such as ulcerative colitis or malignancies) by x-ray and sigmoid pressure measurement. No significant difference was found between the haustral patterns with respect to the presence or absence of an increased motility index. However, when the subgroup having an S-shaped haustral pattern was analyzed separately, an increased motility index was found with a significantly higher frequency (61%, $p<0.05$) than among patients with normal haustration (40%). Sigmoid diverticula as well as diverticulitis occurred with significantly higher frequencies ($p<0.05$) among patients with an increased haustral pattern than among patients with normal or decreased haustral patterns. It is concluded that an interpretation of colonic haustral pattern in terms of muscular activity is unwarranted.

5569 LEIOMYOSARCOMA OF THE RECTUM: RADICAL VS. CONSERVATIVE THERAPY AND REPORT OF THREE CASES. (Eng.) Labow, S. B.; Hoexter, B. (29 Barstow Rd., Great Neck, NY 11021). *Dis. Colon Rectum* 20(7):603-605; 1977.

5570 COLITIS CYSTICA PROFUNDA: REPORT OF A CASE IN WHICH DIFFERENTIATION FROM RECTAL CANCER WAS DIFFICULT. (Eng.) Nagasako, K.; Nakae, Y.; Kitao, Y.; Aoki, G. (Tokyo Women's Medical Coll., 10 Kawadacho, Shinjukuku, Tokyo, Japan). *Dis. Colon Rectum* 20(7):618-624; 1977.

5571 AN UNUSUAL COMPLICATION OF THE TEFLON-SLING REPAIR OF RECTAL PROLAPSE: REPORT OF A CASE. (Eng.) Goldman, S. L.; Fecteau, J. G.; Moore, D. B. (Veterans Admin. Hosp., 150 Muir Rd., Martinez, CA 94553). *Dis. Colon Rectum* 20(7):611-612; 1977.

5572 PROCIDENTIA OF THE RECTUM AFTER THE PULL-THROUGH OPERATION: AN UNUSUAL COMPLICATION AND REPORT OF TWO CASES. (Eng.) Ruiz, J. T. P.; Gennaro, A. R. (Brooklyn-Cumberland Medical Center, 121 Dekalb Ave., Brooklyn, NY 11201). *Dis. Colon Rectum* 20(7):608-610; 1977.

5573 MALIGNANT MELANOMA OF THE ANUS IN A NEGRO: REPORT OF A CASE AND REVIEW OF THE LITERATURE. (Eng.) Quinn, D.; Selah, C. (401 Lowell Drive, S.E., Huntsville, AL 35801). *Dis. Colon Rectum* 20(7):627-631; 1977.

5574 THIO-TEPA IN THE MANAGEMENT OF ANORECTAL CONDYLOMATA ACUMINATA: REPORT OF TWO CASES. (Eng.) Kerstein, M. D. (Michael Reese Hosp., 29th St. and Ellis Ave., Chicago, IL 60616). *Dis. Colon Rectum* 20(7):625-626; 1977.

5575 USE OF CHLORPROMAZINE IN THE TREATMENT OF ADYNAMIC ILEUS. (Eng.) Kinnaert, P.; Panda, M.; Deuvaert, F. (Hopital Universitaire Brugmann, Place Van Gehuchten 4, B-1020 Brussels, Belgium). *World J. Surg.* 1(5):655-660; 1977.

5576 ASSESSMENT OF COLONIC PERMEABILITY USING ^{14}C ERYTHRITOL FLUX [Abstract]. (Eng.) Keller, R. W. (Veterans Admin. Hosp., Salt Lake City, UT). *Gastroenterolgy* 72(5, Part 2):1079; 1977.

5577 REDUNDANT SIGMOID COLON AND CHRONIC IDIOPATHIC CONSTIPATION (CIC) [Abstract]. (Eng.) Pozzessere, C.; Corazziari, E.; Dani, S.; Fraracci, L.; Torsoli, A. (II Clinica Medica, Universita di Roma, Rome, Italy). *Gastroenterology* 72(5, Part 2):1113; 1977.

5578 EARLY DETECTION OF COLONIC CARCINOMA BY MASS SCREENING FOR OCCULT STOOL BLOOD: PRELIMINARY REPORT [Abstract]. (Eng.) Bond, J. H.; Gilbertsen, V. A. (Dept. Medicine, Univ. Minnesota, Minneapolis, MN). *Gastroenterology* 72(5, Part 2):1031; 1977.

5579 RESULTS OF A SCREENING PROGRAM FOR THE DETECTION OF EARLY COLON CANCER AND POLYPS USING FECAL OCCULT BLOOD TESTING [Abstract]. (Eng.) Winawer, S. J.; Leidner, S. D.; Miller, D. C.; Schottenfeld, D.; Befler, B.; Kurtz, R. C.; *et al.* (Memorial Sloan-Kettering Cancer Center, New York, NY). *Gastroenterology* 72(5, Part 2): 1150; 1977.

5580 EARLY COLON CANCER: A MEANINGFUL CONCEPT [Abstract]. (Eng.) Waye, J. D. (Mount Sinai Medical Sch., New York, NY). *Gastroenterology* 72(5, Part 2):1146; 1977.

5581 ^{3}H-THYMIDINE STUDIES IN INDIVIDUALS AT HIGH RISK FOR COLON CANCER [Abstract]. (Eng.) Deschner, E. E.; Long, F. C.; Winawer, S. J. (Memorial Sloan-Kettering Cancer Center, New York, NY). *Gastroenterology* 72(5, Part 2):1048; 1977.

5582 METABOLIC EPIDEMIOLOGY OF COLON CANCER: FECAL BILE ACIDS AND CHOLESTEROL METABOLITES OF PATIENTS WITH COLON CANCER, ADENOMATOUS POLYPS, FAMILIAL POLYPOSIS OR ULCERATIVE COLITIS [Abstract]. (Eng.) Reddy, B. S.; Weisburger, J. H.; Martin, C. W.; Hedges, A.; Wunder, E. L.; Lipkin, M. (American Health Foundation, Valhalla, NY). *Gastroenterology* 72(5, Part 2):1117; 1977.

5583 ALTERED GLYCOPROTEIN SYNTHESIS BY HUMAN COLONIC ADENOCARCINOMA [Abstract]. (Eng.) O'Gorman, T. A.; LaMont, J. T. (Peter Bent Brigham Hosp., Boston, MA 02115). *Gastroenterology* 72(5, Part 2):1109; 1977.

5584 HOMEOSTATIC CHANGES IN PATIENTS WITH COLONIC AND RECTAL CANCER. (Eng.) Jukhtin, V. I.; Chadaev, A. P.; Frolov, B. A.; Andrjukhin, I. M. (Second Moscow Medical Inst., Moscow, USSR). *Am. J. Proctol.* 28(2):37-44; 1977.

5585 IMMUNE MECHANISMS IN HUMAN COLON CANCER [Abstract]. (Eng.) Hahn, W. V.; Kagnoff, M. F.; Lewis, S.; Trefts, P. (Dept. Medicine, Univ. California, La Jolla, CA 92093). *Gastroenterology* 72(5, Part 2):1067; 1977.

5586 A MODEL OF CLINDAMYCIN ASSOCIATED COLITIS IN RABBITS [Abstract]. (Eng.) Katz, L.; LaMont, J. T.; Trier, J. S.; Sonnenblick, E.; Broitman, S. A.; Rothman, S. W. (Peter Bent Brigham Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2): 1078; 1977.

5587 ISCHEMIC COLITIS. (Eng.) Cogbill, C. L.; Makkar, J.; Campana, H. A.; Park, Y. S. (Veterans Admin. Center, 4100 W. Third St., Dayton, OH 45428). *Am. Surg.* 43(3):137-143; 1977.

5588 MEDICAL MANAGEMENT OF DIVERTICULAR DISEASE: A RANDOM TRIAL [Abstract]. (Eng.) Devroede, G.; Vobecky, J. S.; Vobecky, J. M.; Beaudry, R.; Haddad, H.; Navert, B.; *et al.* (Centre Hospitalier Universitaire, Sherbrooke, Quebec, Canada). *Gastroenterology* 72(5, Part 2): 1157; 1977.

5589 THE EPIDEMIOLOGY, HISTORY AND PATHOGENESIS OF DIVERTICULOSIS COLI--BASIS FOR ITS TREATMENT WITH UNPROCESSED BRAN. (Eng.) Painter, N. S. (Manor House Hosp., London NW 11, England). *Schweiz. Med. Wochenschr.* 107(15):486-493; 1977.

5590 ELECTROMYOGRAPHY OF THE RECTUM AND COLON IN HIRSCHPRUNG'S DISEASE. (Eng.) Marin, A. M.; Rivarola, A.; Garcia, H. (Hospital de Ninos, Gallo 1330, Buenos Aires, Argentina). *J. Pediatr. Surg.* 11(4):547-552; 1976.

5591 A DOUBLE-BLIND EVALUATION OF ANTICHOLINERGIC THERAPY IN THE IRRITABLE BOWEL SYNDROME (IBS) USING COLONIC MYOELECTRICAL RECORDINGS [Abstract]. (Eng.) Sullivan, M. A.; Cohen, S.; Snape, W. J., Jr. (Hosp. Univ. Pennsylvania, Philadelphia, PA). *Gastroenterology* 72(5, Part 2): 1137; 1977.

5592 DIARRHEA IN THE IRRITABLE COLON SYNDROME. (Eng.) Diamant, N. E. (Toronto Western Hosp., 399 Bathurst St., Toronto, Ontario M5T 2S8, Canada). *Can. Med. Assoc. J.* 116(7):745-746; 1977.

5593 A DOUBLE-BLIND STUDY ON THE EFFECT OF DIETARY FIBRE ON STOOL FREQUENCY AND APPEARANCE, ABDOMINAL SYMPTOMS AND SERUM LIPID LEVELS IN PATIENTS WITH THE IRRITABLE BOWEL SYNDROME (IBS) [Abstract]. (Eng.) Watson, W. C.; Corke, M.; Pomare, E. W.; Sullivan, S. N. (Victoria Hosp., London, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1146; 1977.

5594 DIETARY FIBRE IN SCANDINAVIA [Letter to Editor]. (Eng.) Heaton, K. W. (Bristol Royal Infirmary, Bristol BS2 8HW, England). *Lancet* 2(8034):407-408; 1977.

5595 COMBINED FAMILIAL ADENOMATOUS POLYPOSIS OF THE COLON (FPC) AND OF THE STOMACH (FPS)--A MORPHOLOGICAL AND CELL KINETIC STUDY [Abstract]. (Eng.) Tytgat, G. N.; Huibregtse, K.; Muller, J.; Weinstein, W. (Dept. Medicine, Univ. Amsterdam, Amsterdam, Netherlands). *Gastroenterology* 72(5, Part 2):1143; 1977.

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5597 RADIOLOGICAL DIAGNOSIS OF INTESTINAL TUBERCULOSIS [Abstract]. (Eng.) Yoshikawa, Y.; Oda, K. (Sch. Medicine, Juntendo Univ., Tokyo, Japan). *Gastroenterol. Jpn.* 12(1):95; 1977.

5598 ANAL PRESSURE STUDIES IN PARAPLEGIA [Abstract]. (Eng.) Wheatley, I. C.; Hardy, K. J.; Dent, J. (Austin and Repatriation General Hosp. Clinical Sch., Univ. Melbourne, Melbourne, Australia). *Aust. N.Z. J. Surg.* 47(1):114; 1977.

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5600 THE DILEMMA OF PRESERVATION OF THE RECTUM: ILEORECTAL ANASTOMOSIS AFTER TOTAL ABDOMINAL COLECTOMY. (Eng.) Khubchandani, I. T. (Suite 111--Liberty Square Medical Center, Liberty and Seventeenth St., Allentown, PA 18104). *Dis. Colon Rectum* 20(8):649-651; 1977.

5601 TRANSSPHINTERIC APPROACH TO RECTAL LESIONS. (Eng.) Mason, A. Y. (Royal Coll. Surgeons, London, England). *Surg. Annu.* 9:171-194; 1977.

5602 APPROACH TO THE TREATMENT OF ANORECTAL DISEASE, WITH SPECIAL REFERENCE TO HEMORRHOIDS. (Eng.) Lord, P. H. (Wellington Hosp., London, England). *Surg. Annu.* 9:195-211; 1977.

5603 A NEW LOOK AT ILEOSTOMY. (Eng.) Kock, N. G. (Sahlgren's Hosp., Goteborg, Sweden). *Surg. Annu.* 8:241-256; 1976.

5604 SQUAMOUS CELL CARCINOMA OF THE ANUS. (Eng.) Wilson, S. M.; Beahrs, O. H.; Manson, R. (Mayo Graduate Sch. Medicine, Univ. Minnesota, Rochester, MN). *Surg. Annu.* 8:297-303; 1976.

5605 ACUTE SUPPURATIONS OF THE ANORECTUM. (Eng.) Abcarian, H. (Cook County Hosp., Chicago, IL). *Surg. Annu.* 8:305-333; 1976.

See also, 5295, 5317, 5323, 5324, 5338, 5356, 5358, 5359, 5360, 5361, 5421, 5507, 5526, 5529, 5531, 5538, 5552, 5614, 5617, 5622, 5697, 5776, 5780, 5786, 5792, 5793, 5795, 5798, 5799, 5807, 5817, 5818, 5825, 5826.

Ulcerative Colitis

5606 Escherichia coli ANTIBODIES IN PATIENTS WITH INFLAMMATORY BOWEL DISEASE. (Eng.)

Tabaqchali, S.; O'Donoghue, D. P.; Bettelheim, K. A. (St. Bartholomew's Hosp., London E.C.1, England). *Gut* 19(2):108-113; 1978.

To test the hypothesis that specific *Escherichia coli* serotypes are involved in the pathogenesis of inflammatory bowel disease (IBD), sera from 16 patients with Crohn's disease (CD) and 14 with ulcerative colitis (UC) were assayed for the presence of antibodies against 159 *Escherichia coli* O-antigens and compared with sera from 16 matched controls. The majority of patients with IBD had agglutinating antibodies to a higher number of *E. coli* O-antigens and in higher titers than did the controls. The number of positive agglutinins was 0-33 (mean 13.8) in CD, 0-26 (mean 7.9) in UC, and 0-7 (mean 1.5) in controls. Eight patients with IBD and arthropathy had antibodies to fewer O-antigens, 0-7 (mean 3.2). The antibodies were in the IgG and IgM, in titers corresponding to original values. No specific O-serotypes were associated with IBD. Common serotypes, R-plasmid carrying serotypes, and those associated with shigella-like adult diarrhea were detected. *E. coli* antigen 014 was detected only in five patients and 0119 in none. There was no correlation between the number of *E. coli* agglutinins and the site and severity of the disease or type of therapy. It is suggested that the presence of the high numbers of *E. coli* antibodies is secondary to the disease process and is probably not causally involved in the pathogenesis of the disease, but may play a role in the perpetuation of the disease and in the extraintestinal complications.

5607 SECRETORY IMMUNOGLOBULIN DEFICIENCY IN A FAMILY WITH INFLAMMATORY BOWEL DISEASE.

(Eng.) Engstrom, J. F.; Arvanitakis, C.; Sagawa, A.; Abdou, N. I. (Kansas Univ. Medical Center, Rainbow Blvd. at 39th St., Kansas City, KS 66103). *Gastroenterology* 74(4):747-751; 1978.

A family in which 4 of 10 first-degree relatives were affected with inflammatory bowel disease (IBD) was studied to determine whether any distinct immunological abnormalities occur in the affected members, as compared with unaffected members of the family, 5 normal controls, and 8 other unrelated patients with IBD. RBC type and histocompatibility locus antigen (HL-A) phenotypes did not distinguish between healthy and affected members, although HL-A2, 32, B27, and B12 were the predominant haplotypes in members with IBD. There was no significant difference between the two groups in the lymphocyte subpopulation counts of T cells, B cells, and cells carrying crystalline fragment (Fc) or complement receptors. The *in vitro* mitogen response, however, to phytohemagglutinin and pokeweed mitogen were depressed in the affected members. Serum IgA and complement component C3 levels were significantly elevated in members with IBD compared to healthy subjects with values of 232 ± 69 versus 148 ± 29 mg/dl for IgA ($p<0.05$) and 173 ± 32 versus 115 ± 22 mg/dl for C3 ($p<0.025$), resp. Plasma and, to a lesser extent, peripheral lymphocytes from two affected members who were tested were cytotoxic to allogeneic colonic epithelial cells. Salivary IgA was normal in the affected family members and unrelated patients with IBD. However, the free secretory component of salivary IgA was absent or markedly depressed in family members, as well as in unrelated patients with ulcerative colitis. This deficiency of the secretory immune system appears to characterize more frequently ulcerative colitis than Crohn's disease and may compromise mucosal host defenses in IBD.

5608 SERUM AND FAECAL LYSOZYME IN INFLAMMATORY BOWEL DISEASE.

(Eng.) Klass, H. J.; Neale, G. (Manchester Royal Infirmary, Manchester, England). *Gut* 19(3):233-239; 1978.

To assess the clinical value of measuring serum lysozyme in inflammatory bowel disease, lysozyme concentrations were measured in the serum and stools of 61 patients with inflammatory bowel disease and compared with those in 29 normal controls, 20 patients with noninflammatory gastrointestinal disease, and 20 patients without gastrointestinal disease. By the turbidometric method, lysozyme values were considerably greater in the serum of patients with active Crohn's disease (9.2 ± 2.7 μg/ml) than in the serum of healthy controls (4.4 ± 2.0 μg/ml). They did not, however, distinguish individual patients with Crohn's disease from those with ulcerative colitis or from those with a variety of other gastrointestinal conditions. The lysoplate method gave much higher values for serum lysozyme than did the turbidometric method, but there was a considerable overlap between the results for patients with Crohn's disease (60.1 ± 30.7 μg/ml) and normal controls (27.4 ± 17.5 μg/ml). There was only a moderate correlation between the results given by the two methods ($r=0.56$), and it is suggested that factors other than enzyme activity and methodological variation are responsible for the observed differences. This idea is supported by the finding that with Crohn's disease in remission serum lysozyme values (lysoplate) returned to normal values; however, with the turbidometric method, they remained raised. Mean fecal lysozyme levels, expressed either as a concentration or as total daily excretion, in patients with inflammatory bowel disease were significantly greater than values in healthy controls ($p<0.05$) and in diseased subjects without diarrhea ($p<0.05$) but were not significantly different from those subjects with other causes of diarrhea. The present evidence suggests that the role of lysozyme in inflammatory bowel disease is of epiphenomenonal rather than pathogenetic significance. The present results suggest that it is unlikely to come into routine use as a diagnostic marker or as an index of activity in inflammatory bowel disease.

5609 HYPOSPLENISM IN INFLAMMATORY BOWEL DISEASE. (Eng.) Ryan, F. P.; Smart, R. C.; Holdsworth, C. D.; Preston, F. E. (Royal Infirmary, Sheffield, England). *Gut* 19(1):50-55; 1978.

Since hyposplenism has been reported in patients with ulcerative colitis, splenic function was assessed in 35 patients with ulcerative colitis and 20 patients with Crohn's disease. Hyposplenism was diagnosed if there were Howell-Jolly bodies in the peripheral blood film or if there was prolongation of clearance from the peripheral blood of injected ^{51}Cr-labeled heat-damaged RBC. Thirteen patients with ulcerative colitis had hyposplensim as compared with only one patient with Crohn's disease. Conversely, heat-damaged RBC clearance values faster than the normal range were found in 6 of the 20 patients with Crohn's disease. Four patients with hyposplenism and ulcerative colitis developed life-threatening septicemia in the early postcolectomy period, two of these being further complicated by disseminated intravascular coagulation. These studies indicate that hyposplenism is a common complication of ulcerative colitis, occurring only in those patients with extensive colonic involvement and having either a severe relapse or a persistently active course.

5610 SERIAL CARCINOEMBRYONIC ANTIGEN (CEA) BLOOD LEVELS IN PATIENTS WITH ULCERATIVE COLITIS. (Eng.) Gardner, R. C.; Feinerman, A. E.; Kantrowitz, P. A.; Gootblatt, S.; Loewenstein, M. S.; Zamcheck, N. (Mount Auburn Hosp., 330 Mount Auburn St., Cambridge, MA 02138). *Am. J. Dig. Dis.* 23(2):129-133; 1978.

Fifty-seven patients with ulcerative colitis were followed 1-49 months (mean, 18 months) with serial carcinoembryonic antigen (CEA) determinations during periods of remission, mild relapses, and severe relapses, to assess the clinical usefulness of CEA titers in ulcerative colitis. Elevated CEA titers correlated with activity (i.e., severity, $p<0.005$) and possibly extent of disease ($p<0.1$): 12% of patients with proctitis, 47% of patients with left-sided colitis, and 60% of patients with transverse or universal colitis had elevated CEA titers during a flare. Moreover, 24% of patients with mild flares and 86% of patients with severe flares had elevated CEA titers. Ninety-two percent of patients with extensive disease and severe flares had elevated CEA titers. Elevated CEA titers were correlated with histologic findings in three patients. Mucosal inflammation was demonstrated by colonoscopy and confirmed by biopsy in one patient with persistently elevated CEA titers during clinical remission. In two other patients with active disease whose CEA titers fell prior to colectomy, marked denudation of colonic mucosa was noted. In this study, a transiently elevated CEA titer indicated either clinically active ulcerative colitis or active inflammation of colonic mucosa.

5611 CIRCULATING IMMUNE COMPLEXES IN ULCERATIVE COLITIS. I. CORRELATION TO DISEASE ACTIVITY. (Eng.) Nielsen, H.; Binder, V.; Daugharty, H.; Svehag, S. E. (Inst. Medical Microbiology, Odense Univ., DK-5000 Odense, Denmark). *Clin. Exp. Immunol.* 31(1):72-80; 1978.

Twenty-two patients with ulcerative colitis (UC) were studied to determine whether the presence of circulating immune complexes (IC) correlates with disease duration or activity and to determine the effect of medical treatment on circulating IC levels. The occurrence of IC was analyzed by three independent methods; a complement consumption assay, a Clq-binding assay, and a rheumatoid (RF)-binding assay. Antinuclear factor (ANF) and RF determinations were also performed to evaluate the possible contribution of these antibody activities to the IC demonstrated. All patients had UC in an active stage when the study was initiated. Positiveness in two or more test systems was considered to indicate the presence of IC in the serum sample examined. By this criterion, circulating complement-fixing IC were detected in 8 of the 22 patients (95% confidence limits: 17-60%). IC were detected most frequently in patients with long-standing disease. A correlation ($p<0.01$) between the occurrence of circulating IC and disease activity, in terms of visible blood in feces and number of bowel movements per day, was demonstrated. Cytological examination of the rectal mucus indicated moderate to severe inflammation in all IC-positive patients. Six of the eight IC-positive patients were subjected to short-term glucocorticosteroid treatment. Only one of these patients exhibited circulating IC and high disease activity after treatment; this patient was colectomized. Salazosulphapyridine treatment showed no relation to IC occurrence. None of the 22 sera were RF-positive. Four of the 22 patients (95% confidence limits 5-40%) were positive for organ nonspecific ANF, but the presence of ANF did not correlate with circulating IC. There was no significant correlation between antibody titers to *Escherichia coli* 0119:B14 antigen and IC occurrence. These studies indicate that there is a correlation between IC and disease activity and duration.

5612 CIRCULATING IMMUNE COMPLEXES IN ULCERATIVE COLITIS. II. CORRELATION WITH SERUM PROTEIN CONCENTRATIONS AND COMPLEMENT CONVERSION PRODUCTS. (Eng.) Nielsen, H.; Petersen, P. H.; Svehag, S. E. (Inst. Medical Microbiology, Odense Univ., DK-5000 Odense, Denmark). *Clin. Exp. Immunol.* 31(1):81-91; 1978.

To determine whether there is a correlation between the occurrence of circulating immune complexes (IC) and the serum concentration of native and/or activated complement factors in ulcerative colitis, several serum proteins were quantified in 22 patients with active disease, and the findings were related to disease activity and occurrence of IC. Conversion of complement component C3 was significantly more frequent in the IC-positive group (8 patients) as compared to the IC-negative group (14 patients). Factor $\bar{B}$ was demonstrable in 15 of the 22 patients, and 7 of the 8 IC-positive patients had detectable levels of factor $\bar{B}$. There was no difference between the IC-positive and the IC-negative group as regards serum concentrations of the complement factors C3, C4, and factor B, or serum orosomucoid, albumin, IgM, and IgG. In contrast, the serum IgA levels were reduced in the IC-positive group, in comparison with the IC-negative group ($p<0.05$). C3 and factor B were significantly elevated in four patients with severe disease activity, compared with the reference group ($p<0.01$). C3, factor B, and C4 concentrations showed a positive correlation to the serum orosomucoid levels, factor B having the best correlation ($r=0.88$, $2\alpha<0.001$). The serum concentrations of orosomucoid and albumin were inversely correlated to each other. The deposition of IC in the intestinal mucosa, resulting in complement activation and possibly also local IC-dependent lymphocytotoxicity, are likely to represent contributing pathogenic mechanisms in the tissue destruction observed in the colonic mucosa of ulcerative colitis patients.

5613 SENSIBILITY OF THE RECTUM TO DISTENSION AND THE ANORECTAL DISTENSION REFLEX IN ULCERATIVE COLITIS. (Eng.) Farthing, M. J. G.; Lennard-Jones, J. E. (St. Bartholomew's Hosp., London, England). *Gut* 19(1):64-69; 1978.

The anorectal distention reflex and rectal sensation were studied in 34 patients with colitis and in 15 controls. The maximum volume of air tolerated within a rectal balloon was less in the colitis patients than in normal subjects ($p<0.001$). Smaller volumes were tolerated by patients with a spontaneously bleeding mucosa than by those with less severe inflammation ($p<0.001$). Severe urgency of defecation with incontinence was experienced by about half those with spontaneous mucosal hemorrhage but was infrequent among other colitics. Those patients with inactive colitis and a reduced maximum tolerable volume tended to have a smaller rectal size than those who could tolerate a normal volume within the rectum. Reflex relaxation of the internal anal sphincter on distention of the rectum appeared normal in patients with colitis. The results show that mucosal inflammation affects the sensory response of the rectum to distention, which may be a factor involved in the urgency and incontinence of colitis.

5614 MALAKOPLAKIA IN ULCERATIVE COLITIS. (Eng.) MacKay, E. H. (Leicester Royal Infirmary, Leicestershire, England). *Arch. Pathol. Lab. Med.* 102(3):140-145; 1978.

The case of a 59-yr-old woman with a 30-yr history of proven ulcerative colitis in whom classic malakoplakia was found in the colon is presented. She had undergone total proctocolectomy after failure of medical treatment to control her illness. Immunoperoxidase studies showed immunoglobulins and muramidase within the malakoplakic histiocytes, and electron microscopy showed bacteria resembling *Escherichia coli* in the same cells. Immunologic studies showed an unusually high *E. coli* antibody titer (1:512) in her serum and reduced numbers of circulating T-lymphocytes with reduced cytotoxic activity. This case shows the paradoxical rarity of malakoplakia in ulcerative colitis and reaffirms the presence of an immunologic defect that may be pathogenetically significant.

5615 THROMBOPHLEBITIS MIGRANS IN ULCERATIVE COLITIS. (Eng.) Camilleri, M.; Fenech, F. F. (St. Luke Hosp., Guardamangia, Malta). *Postgrad. Med. J.* 53(626):762-763; 1977.

The case of a 48-yr-old woman suffering from ulcerative colitis and thrombophlebitis migrans is presented. The woman suffered a relapse of the ulcerative colitis, which she had had for 13 yr. She was not clinically anemic or jaundiced. On hospital admission, there was a warm, tender swelling on the medial aspect of the left arm. Sigmoidoscopy was consistent with a diagnosis of active ulcerative colitis. Three days after admission, she developed thrombophlebitis of the left forearm, while the swelling in the upper arm began to subside. This pattern of localized thrombophlebitis continued and involved both legs and both thighs. At each site, it lasted 3-4 days. A panproctocolectomy and ileostomy were performed. Macroscopic examination of the colon revealed total involvement by ulcerative colitis. A thorough histological examination failed to reveal any malignant areas. This is the first reported case of thrombophlebitis migrans in ulcerative colitis. The authors believe that the occurrence of thrombophlebitis migrans in ulcerative colitis warrants a thorough investigation of carcinoma.

5616 INFLAMMATORY BOWEL DISEASE OF THE AGED: A PATHOLOGIC AND DIAGNOSTIC DILEMMA [Abstract]. (Eng.) Lorber, S. H.; Ming, S.; Ritchie, W. G.; Tolin, R.; Mayer, E. (Temple Univ. Health Sciences Center, Philadelphia, PA). *Gastroenterology* 72(5, Part 2):1090; 1977.

5617 GENETIC AND POST-OPERATIVE STUDIES OF ANERGY TO DINITROCHLOROBENZENE (DNCB) IN INFLAMMATORY BOWEL DISEASE (IBD) [Abstract]. (Eng.) Meyers, S.; Sachar, D. B.; Taub, R. N.; Janowitz, H. D. (Mount Sinai Sch. Medicine, City Univ. New York, New York, NY 10029). *Gastroenterology* 72(5, Part 2):1101; 1977.

5618 A MODEL OF ULCERATIVE COLITIS PRODUCED IN THE RABBIT WITH DINITROCHLOROBENZENE (DNCB) [Abstract]. (Eng.) Rabin, B. S.; Rogers, S. J. (Univ. Pittsburgh Sch. Medicine, Pittsburgh, PA 15261). *Gastroenterology* 72(5, Part 2):1114; 1977.

5619 MORPHOLOGICAL CHANGES IN THE RECTAL MUCOSA IN PATIENTS WITH ULCERATIVE COLITIS TREATED WITH DISODIUM CROMOGLYCATE [Abstract]. (Eng.) Mani, V.; Lloyd, G.; Green, F. H. Y.; Fox, H.; Turnberg, L. A. (Hope Hosp., Salford M6 8HD, England). *Gastroenterology* 72(5, Part 2):1093; 1977.

5620 LONG TERM OBSERVATIONS OF CHILDREN WITH ULCERATIVE COLITIS TREATED WITH AN IMMUNOSUPPRESSIVE (6 MERCAPTOPURINE) [Abstract]. (Eng.) Korelitz, B. I.; Glass, J. L.; Wisch, N. (Lenox Hill Hosp., New York, NY). *Gastroenterology* 72(5, Part 2):1083; 1977.

5621 OPTIMAL DOSE OF SULPHASALAZINE FOR THE MAINTENANCE TREATMENT OF ULCERATIVE COLITIS: INTERIM RESULTS OF A CONTROLLED THERAPEUTIC TRIAL [Abstract]. (Eng.) Khan, A. K. A.; Howes, D. T.; Piris, J.; Truelove, S. C. (Radcliffe Infirmary, Oxford, England). *Gut* 18(5):A421-A422; 1977.

5622 ENTERITIS AND THE CONTINENT ILEOSTOMY. (Eng.) King, S. A. (Stamford Hosp., Stamford, CT). *Conn. Med.* 41(8):477-479; 1977.

See also, 5127, 5302, 5550, 5582, 5597, 5837, 5838.

PANCREAS

5623 HUMAN ISLET CELL TUMOR STORING PANCREATIC POLYPEPTIDE: A LIGHT AND ELECTRON MICROSCOPIC STUDY. (Eng.) Bordi, C.; Togni, R.; Baetens, D.; Ravazzola, M.; Malaisse-Lagae, F.; Orci, L. (Institut d'Histologie et d'Embryologie, Ecole de Medecine, 1211 Geneve 4, Switzerland). *J. Clin. Endocrinol. Metab.* 46(2):215-219; 1978.

Pancreatic polypeptide (PP) isolated from a 45-yr-old man with an islet cell tumor storing PP was studied ultrastructurally. During surgery for long-standing peptic ulcer disease, the pancreas was investigated for suspected Zollinger-Ellison syndrome, and tumor nodules were found. The tumor tissue was examined by immunofluorescence and showed specific staining only after incubation with anti-pancreatic polypeptide. Negative results were obtained with antisera directed against insulin, pancreatic glucagon, somatostatin, insulin, vasoactive intestinal peptide, secretin, and gastrin. Electron microscopy revealed a homogeneous population of small granule-containing cells. This case illustrates a tumor composed of a single hormone-producing cell type and allows definition of the ultrastructural features of human pancreatic polypeptide-containing cells.

5624 PANCREATIC PSEUDOCYST: MANAGEMENT IN FIFTY-FOUR PATIENTS. (Eng.) Pollak, E. W.; Michas, C. A.; Wolfman, E. F., Jr. (8940 Nall Ave., Overland Park, KS 66207). *Am. J. Surg.* 135 (2):199-201; 1978.

The management of pancreatic pseudocyst was reassessed in 54 patients followed for 3 months to 9 yr after diagnosis. All patients were initially managed nonoperatively. Only 16 regressed with nonoperative management; 6 died of septic complications, and 32 eventually required operation. Most pseudocysts did not regress with nonoperative therapy, emphasizing the need of serial clinical and ultrasonic examination at frequent intervals to detect nonresolution or complications requiring earlier operation than previously advocated.

5625 ISOLATION AND CHARACTERIZATION OF THE GLYCOPEPTIDE FROM A PANCREATIC CYST. (Eng.) Masuda, H.; Schichijo, S.; Takeuchi, M. (Kurume Univ., Sch. Medicine, Kurume, Fukuoka 830, Japan). *Int. J. Biochem.* 8(9):627-631; 1977.

5626 RADIONUCLIDE PANCREATIC SCANNING: A RETROSPECTIVE ANALYSIS. (Eng.) Kitchen, P. R. B.; Wettenhall, J. M.; Andrews, J. T. (Royal Melbourne Hosp., Victoria 3050, Australia). *Aust. N.Z. J. Surg.* 47(4):501-505; 1977.

5627 MULTINUCLEATED GIANT CELL NEOPLASM OF PANCREAS: LIGHT AND ELECTRON MICROSCOPY FEATURES. (Eng.) Robinson, L.; Damjenov, I.; Brezina, P. (Univ. Alabama Medical Center, Birmingham, AL 35294). *Arch. Pathol. Lab. Med.* 101(11): 590-593; 1977.

5628 ULTRASONOGRAPHY OF A MEDIASTINAL PSEUDOCYST. (Eng.) Asokan, S.; Alagratnam, D.; Eftaha, M.; Radhakrishnan, J.; Lim, L. T.; Teresi, M. (Cook County Hosp., 1825 West Harrison St., Chicago, IL 60612). *Am. J. Roentgenol.* 129 (5):923-924; 1977.

5629 SEROTYPING OF Pseudomonas aeruginosa FROM PATIENTS WITH CYSTIC FIBROSIS OF THE PANCREAS. (Eng.) Hirao, Y.; Homma, J. Y.; Zierdt, C. H. (Inst. Medical Science, Univ. Tokyo, Shirokanedai, Mimato-ku, Tokyo 108, Japan). *Jpn. J. Exp. Med.* 47(4):249-254; 1977.

5630 PAPILLARY CYSTADENOCARCINOMA OF THE PANCREAS. (Eng.) Golematis, B.; Georgakakis, A.; Bastounis, E.; Bramis, J.; Dreiling, D. A. (Medical Sch., Univ. Athens, Athens, Greece). *Am. J. Gastroenterol.* 67(6):600-603; 1977.

5631 FOLLOW-UP STUDIES OF RADICAL RESECTION FOR PANCREATICODUODENAL CANCER.

(Eng.) Sato, T.; Saitoh, Y.; Noto, N.; Matsuno, S. (Tohoku Univ. Sch. Medicine, Sendai 980, Japan). *Ann. Surg.* 186(5):581-588; 1977.

See also, 5290, 5330, 5331, 5332, 5346, 5351, 5352, 5364, 5366, 5367, 5486, 5550, 5632, 5634, 5661, 5776, 5790.

PANCREAS

Pancreatitis

5632 GLUCAGON INHIBITION OF SECRETIN AND COMBINED SECRETIN AND CHOLECYSTOKININ STIMULATED PANCREATIC EXOCRINE SECRETION IN HEALTH AND DISEASE.

(Eng.) Clain, J. E.; Barbezat, G. O.; Waterworth, M. M.; Bank, S. (Groote Schuur Hosp., Observatory, 7925, Cape Town, South Africa). *Digestion* 17(1):11-17; 1978.

To investigate the potential therapeutic value of glucagon in acute pancreatitis, the effect of glucagon infusion on secretin- and on secretin plus cholecystokinin (CCK)-stimulated exocrine pancreatic secretion was studied in 12 normal subjects, 11 patients at least 6 weeks post acute pancreatitis (PAP), and in 10 patients with chronic calcifying pancreatitis (CCP). Secretin (1 µg/kg/hr) or secretin plus CCK (1 µg/kg/hr) were infused for the entire 200-min test period; 60 min after the start of infusion, glucagon was also infused (7.5 µg/kg/hr for 40 min, then 15 µg/kg/hr for 40 min). Duodenal samples were collected at 10-min intervals. In the secretin-stimulated trials, glucagon had no effect on secretin volume in controls or in the CCP group, but significantly increased the volume in the PAP group ($p<0.025$). Bicarbonate concentration was unaffected, its output following the volume changes. Protein concentration before glucagon was significantly higher in the PAP ($p<0.005$) and CCP ($p<0.05$) groups than in the controls. Glucagon significantly decreased pancreatic protein secretion in all three groups ($p<0.05$ for controls and PAP, $p<0.02$ for CCP). Bile pigment production was higher in PAP and CCP groups than in controls before glucagon infusion, rose in all groups during infusion, and returned to initial values in the PAP and CCP groups while increasing ninefold ($p<0.01$) in the controls after infusion. In the secretin plus CCK trials, the only significant changes in volume or bicarbonate output occurred in the controls ($p<0.05$). Protein concentration decreased significantly in the controls and PAP group ($p<0.02$), and protein output decreased significantly in all groups ($p<0.025$) due to glucagon infusion. Bile pigment production decreased significantly in the controls ($p<0.05$) and PAP group ($p<0.02$), returning to normal upon glucagon withdrawal. In all individuals in all trials there was a rise in blood glucose during glucagon infusion; after the infusion, the controls became hypoglycemic, but the response of the patients was variable due to diabetes in five of them. These results indicate that glucagon given by constant infusion produces inhibition of pancreatic enzyme secretion in healthy volunteers and in patients with pancreatic disease and that further trials of glucagon in the therapy of acute pancreatitis are warranted.

5633 FAILURE OF GLUCAGON IN THE TREATMENT OF ALCOHOLIC PANCREATITIS.

(Eng.) Olazabal, A.; Fuller, R. (Cleveland Veterans Admin. Hosp., 10701 E. Blvd., Cleveland, OH 44106). *Gastroenterology* 74(3):489-491; 1978.

To evaluate the efficacy of glucagon for alcohol-related pancreatitis, a controlled, randomized, double-blind study was carried out in 26 patients with pancreatitis associated with alcohol ingestion. These patients received either glucagon or placebo in addition to i.v. fluids, nasogastric suction, and meperidine as needed. There were no statistically significant differences between the group that received glucagon and the group that did not in any of 12 parameters, which included symptoms, signs, laboratory tests, and requests for analgesia. It is concluded that glucagon in addition to conventional therapy is no better for the treatment of alcoholic pancreatitis than conventional therapy alone.

5634 ENDOSCOPIC RETROGRADE PANCREATOGRAPHY: ANALYSIS OF THE NORMAL PANCREATOGRAM, AND CHANGES WHICH ARE ASSOCIATED WITH CHRONIC PANCREATITIS AND PANCREATIC CANCER.

(Eng.) Roberts-Thomson, T. C. (Royal Melbourne Hosp., Victoria 3050, Australia). *Med. J. Aust.* 2(24):793-796; 1977.

Studies were carried out to define the normal pancreatogram, to categorize changes in the main pancreatic duct, and to determine the relative frequency of these changes in patients with chronic pancreatitis and pancreatic cancer. The dimensions of the normal pancreatogram were determined by studies in 30 adults without demonstrable pancreatic disease. The main pancreatic duct had a mean maximum diameter of 3.1 mm, 2.3 mm, and 1.4 mm in the head, body, and tail of the pancreas, resp.; diameters at the upper limit of normal were 4 mm, 3 mm, and 2 mm in these three regions. The relative frequency of changes in the main pancreatic duct was determined in 45 patients with chronic pancreatitis and 14 patients with pancreatic cancer. Obstruction of the main duct was usually associated with cancer, whereas dilatation throughout the duct was only observed in chronic pancreatitis. Segmental stricture was common in both diseases, but analysis of the corresponding cholangiogram permitted differentiation in some patients. Gross distortion of the duct system occurred only in chronic pancreatitis, and was frequently associated with calcification, which was seen on plain abdominal x-ray film. The main pancreatic duct showed no abnormalities in 5/45 patients with chronic pancreatitis and 1/14 patients with cancer. The analysis of changes in the main pancreatic duct usually permitted differentiation of chronic pancreatitis from pancreatic cancer. This study corroborates previous reports of the value of pancreatography in the diagnosis of chronic pancreatitis and pancreatic cancer.

5635 PARENTERAL FEEDING IN POSTOPERATIVE PANCREATITIS. (Ger.) Hartig, W.; Albert, H.; Czarnetzki, H. D. (I. Chirurgischen Klinik des Bezirkskrankenhauses St. Georg., Strasse der DSF 141, DDR-7021 Leipzig, E. Germany). *Dtsch. Z. Verdau. Stoffwechselkr.* 37(1):7-16; 1977.

5636 CLINICAL ASPECTS OF CHRONIC PANCREATITIS IN ADULTS. (Ita.) Dobrilla, G. (Ospedale Generale Regionale di Bolzano, Bolzano, Italy). *Minerva Med.* 68(30):2087-2092; 1977.

5637 CURRENT PATHOLOGICAL PROBLEMS OF CHRONIC PANCREATITIS. (Ita.) Giarelli, L.; Stanta, G.; Di Bonito, L.; Brollo, A. (Istituto di Anatomia e Istologia Patologica, Universita degli Studi di Trieste, Trieste, Italy). *Minerva Med.* 68(30):2063-2076; 1977.

5638 PATHOGENETIC ASPECTS OF CHRONIC PANCREATITIS. (Ita.) Gullo, L.; Fontana, G.; Costa, P. L.; Bolondi, L.; Ventrucci, M.; Caletti, G. C.; *et al.* (Istituto di Clinica Medica I, Universita degli Studi di Bologna, Bologna, Italy). *Minerva Med.* 68(30):2057-2061; 1977.

5639 FAMILIAL CHRONIC PANCREATITIS. (Fre.) Selman, M. (Universite Claude Bernard, Lyon, France). *Rev. Fr. Gastroenterol.* (129):59-65; 1977.

5640 CLINICO-MORPHOLOGICAL COMPARISONS OF PANCREATIC CHANGES. (Rus.) Matveeva, I. I.; Yakubovich, A. A. (Propedeutic Dept. Internal Medicine, Leningrad Inst. Hygiene and Medicine, Leningrad, USSR). *Klin. Med. (Mosk.)* 55(2):48-50; 1977.

5641 AN INFILTRATIVE FORM OF ACUTE PANCREATITIS AND ITS EVOLUTION. (Rus.) Filin, V. I.; Krokhin, Ju. Ya.; Mukhina, T. V.; Sukharev, V. F. (I. I. Dzhanelidze Leningrad Scientific Res. Inst. First Aid, Leningrad, USSR). *Vestn. Khir.* 118(2): 8-12; 1977.

5642 PATHOGENESIS OF ACUTE PANCREATITIS. (Rus.) Ivashkevich, G. A. (Dept. Hosp. Surgery, Lvov Medical Inst., Lvov, USSR). *Klin. Khir.* (4): 7-13; 1977.

5643 CHANGES IN PROTEIN METABOLISM IN PATIENTS WITH ACUTE PANCREATITIS. (Rus.) Graudinsh, J. J.; Chernyakova, D. E.; Slyshane, S. J. (Surgical Clinic, Riga Medical Inst., Riga, USSR). *Khirurgiia (Mosk.)* (3):79-83; 1977.

5644 SIGNIFICANCE OF IMMUNOLOGICAL INVESTIGATIONS IN PANCREATITIS. (Rus.) Vel'bri, S. K. (Central Medical Scientific Res. Lab., Tartu Univ., Tartu, USSR). *Ter. Arkh.* 49(2):142-147; 1977.

See also, 5330, 5331, 5352, 5367, 5481, 5550, 5624, 5626.

LIVER AND BILIARY TRACT

5645 SEVERE CHRONIC ACTIVE LIVER DISEASE: PROGNOSTIC SIGNIFICANCE OF INITIAL MORPHOLOGIC PATTERNS. (Eng.) Schalm, S. W.; Korman, M. G.; Summerskill, W. H. J.; Czaja, A. J.; Baggenstoss, A. H. (Mayo Clinic, Rochester, MN 55901). *Am. J. Dig. Dis.* 22(11):973-980; 1977.

To determine the usefulness of recognizing different morphologic patterns of chronic active liver disease (CALD), clinical and biochemical features were compared with response to treatment in 32 patients with chronic active hepatitis (CAH), 36 with subacute hepatitis and bridging necrosis (SHB), 30 with subacute hepatitis and multilobular necrosis (SHMN), and 30 with cirrhosis and active hepatitis (Cirrh). Of the 128 patients, 99 were treated with prednisone (20 mg daily or 10-50 mg every other day) or prednisone (10 mg daily) plus azathioprine (50 mg daily). The type of morphological lesion did not correlate with clinical or etiologic features. Patients with CAH had less severe biochemical abnormalities, entered remission more often (77% versus 57% for SHB, 60% for SHMN, or 56% for Cirrh), and failed to respond to treatment less frequently (4% versus 20% for SHB, 24% for SHMN or 33% for Cirrh) than those with SHMN or Cirrh. SHB and SHMN tended to be more frequently associated with a short duration of symptoms, whereas ascites and varices were more frequent in Cirrh. CAH differed from Cirrh and SHMN by the lower incidence of spider nevi ($p<0.05$). Abnormalities in SGOT, bilirubin, albumin, gamma globulin, and prothrombin time were usually more severe in SHB, SHMN, and Cirrh than in CAH. Stepwise discriminant analysis showed that the presence of vascular spiders and the degrees of SGOT elevation and hypoalbuminemia were each significantly less frequent ($p<0.05$) in CAH than in Cirrh. Vascular spiders and the degree of elevation of SGOT in SHMN and the incidence of viral features in SHB distinguished these lesions from CAH. There were significantly lower ($p<0.05$) serum albumin concentrations in Cirrh than in SHMN. Serial liver biopsies disclosed all possible transitions between the various lesions in individual patients. Patients receiving prednisone usually improved from SHB or SHMN through CAH to chronic persistent hepatitis. CAH, SHB, SHMN, and Cirrh, therefore, reflect the degree and extent of disease activity at any given time in CALD, rather than representing different conditions.

5646 SERUM GLYCOPROTEIN TESTS IN LIVER DISEASES. (Hun.) Feher, J.; Jakab, L.; Lengyel, G.; Romics, L. (III. Belgyogyaszati Klinika, Semmelweis Orvostudomanyi Egyetem, Budapest, Hungary). *Orv. Hetil.* 118(43):2579-2581; 1977.

The serum haptoglobin, hemopexin, alpha-1-antitrypsin, and orosomucoid levels were studied in 123 patients with chronic hepatopathies and 18 healthy controls to assess the diagnostic value of these glycoproteins. Chronic persistent hepatitis was diagnosed in 9 patients, chronic aggressive hepatitis in 27, postnecrotic cirrhosis in 26, hyperlipoproteinemia without hepatic changes in 10, hyperlipoproteinemia with histologically manifest hepatic steatosis in 19, alcoholic liver cirrhosis in 17, and chronic cholangiohepatitis in 15. Compared to controls, the serum glycoprotein concentrations showed no changes in patients with chronic persistent hepatitis, while the haptoglobin level decreased in patients with chronic aggressive hepatitis and postnecrotic liver cirrhosis but increased in those with liver steatosis, alcoholic liver cirrhosis, and cholangiohepatitis. The hemopexin concentration was reduced in patients with liver cirrhosis and increased in those with hyperlipoproteinemia with or without steatosis or chronic cholangiohepatitis. The alpha-1-antitrypsin concentration was increased in patients with alcoholic liver cirrhosis. The orosomucoid level decreased in patients with postnecrotic cirrhosis. The findings indicate the potential diagnostic value of serum glycoprotein tests in various hepatopathies.

5647 ELECTROLYTES AND MICROELEMENTS OF THE BLOOD AND BILE IN PATIENTS WITH CHRONIC DISEASES OF THE LIVER AND BILE DUCTS. (Rus.) Revutskii, B. I. (Medical Inst., Donetsk, USSR). *Vrach. Delo* (9):81-86; 1977.

The electrolyte and trace element composition of the blood and bile was studied in a group of 215 patients with chronic lesions of the liver and biliary ducts. The group included 125 patients with chronic cholangiohepatitis, 59 with chronic hepatitis, and 31 with cirrhosis. A positive correlation between the potassium content and total protein in the vesical fraction of the bile was observed in the patients with chronic cholangiohepatitis, while the patients with chronic hepatitis and cirrhosis showed positive correlation between the potassium level and residual nitrogen level in the liver fraction of the bile.

5648 LIPID SUBSTRATES FOR LCAT ACTIVITY IN LIVER DISEASE. (Eng.) Salvioli, G.; Lugli, R.; Salati, R. (Dept. Clinical Medicine, Univ. Modena, Modena, Italy). *Scand. J. Gastroenterol.* 12(7):841-847; 1977.

To investigate the possibility that the low content of unsaturated fatty acids in the phosphatidylcholine (PC) of high density lipoproteins (HDL) could reduce the rate of cholesterol esters (CE) in the plasma, the activity of the plasma lecithin: cholesterol acyltransferase (LCAT) was studied in eight healthy controls, six patients with obstructive jaundice, and eight patients with advanced liver cirrhosis. Polyunsaturated PC (PU-PC, 3 g, i.v.), as a special substrate, was administered to all subjects. Before and after the infusion, the transesterification rate was assayed by three different methods: (1) assay using plasma against a standard substrate, (2) assay of pooled plasma of normal subjects against substrate prepared from the plasma of the patients, and (3) assay in which free cholesterol was labeled in autologous plasma serving as both enzyme and substrate source. In normal subjects, no statistically significant differences of the enzyme activity levels were observed before PU-PC infusion. There was a tendency to lower LCAT activity in patients with liver disease compared with normal subjects before PU-PC infusion. After PU-PC infusion, a significant increase of LCAT activity was observed with methods 2 and 3 in patients with cholestasis (32.8/47.2 and 30.4/51.1 μM/l/hr, resp.) and with method 3 in patients with cirrhosis (20.3/34.6 μM/l/hr). Gas chromatography of HDL-PC and HDL-cholesterol revealed a low content of polyunsaturated fatty acids in patients with liver disease as compared to normals. PU-PC infusion yielded an increased content particularly of linoleic acid in these HDL lipids. Since the LCAT-mediated reaction takes place on or within

HDL and since the activation of LCAT was most effective with PU-PC, the transesterification of cholesterol appears to depend on HDL enriched in PU-PC as the preferred substrate for LCAT.

5649 LAPAROSCOPY IN THE DIAGNOSIS OF PRIMARY CANCER OF THE LIVER.

(Rus.) Chernekhovskaia, N. E.; Anchukova, E. L.; Chechulina, A. P. (Dept. Endoscopy, S. P. Botkin Clinical Hosp., Moscow, USSR). *Khirurgiia (Mosk.)* (1):47-49; 1978.

To improve the differential diagnosis of primary and metastatic liver carcinoma, the results of laparoscopy performed in 24 patients with primary liver carcinoma are reviewed. The patients were seen with asthenia (12), pain in the right hypochondrium (17), weight loss (9), loss of appetite (6), and fever (6). All patients had liver enlargement, and 12 patients had yellowness of the skin and sclera. Only four patients had an initial clinical diagnosis of primary carcinoma, while the rest of the patients underwent laparoscopy with an initial diagnosis of cirrhosis, tumor of the abdominal cavity, cholecystitis, cancer of the pancreas head, obstructive jaundice, acute pancreatitis, and gallbladder or right colon cancer. At laparoscopy, 8 patients were found to have the nodular variant of primary liver carcinoma, 6 were found to have the massive variant (large tumor up to 8-10 cm in diameter in the right lobe and multiple small metastatic nodes in the right and left lobes), and 10 patients were found to have the diffuse variant. Cytologic confirmation of the diagnosis was obtained in 11/13 patients subjected to spot biopsy.

5650 SPONTANEOUS RUPTURE OF LIVER TUMORS WITH INTRA-ABDOMINAL HEMORRHAGE AND HEMATOBILIA.

(Rus.) Shapkin, V.; Grinenko, A.; Manikhas, G. (Vladivostok Medical Inst., Vladivostok, USSR). *Klin. Med. (Mosk.)* 55(11):89-93; 1977.

Of 98 patients with primary liver carcinoma, 5 developed spontaneous tumor rupture complicated by intra-abdominal hemorrhage. Correct preoperative diagnosis of intra-abdominal hemorrhage was made in only one patient, while in four patients the disease was misdiagnosed as perforating ulcer or destructive cholecystitis. One patient underwent liver resection and four underwent palliative surgery. Of 36 patients with benign liver tumors, 1 had spontaneous rupture with intra-abdominal hemorrhage and 1 had hematobilia (both patients had hemangiomas).

5651 CLINICAL COURSE AND PROGNOSIS OF ONE HUNDRED AND TWO PATIENTS WITH HEPATIC COMA 1958 THROUGH 1975.

(Eng.) Ukida, M.; Shimada, Y. (Iwakuni Natl. Hosp., 2-5-1 Kuroiso-cho, Iwakuni City, 740 Japan). *Gastroenterol. Jpn.* 12(5):368-379; 1977.

The clinical course and prognosis of hepatic coma were examined in 102 patients treated between 1958 and 1975. The diagnoses included fulminant hepatitis (9), subacute hepatitis (7), liver cirrhosis without liver carcinoma (53), and liver cirrhosis with primary liver carcinoma (33). Four of nine patients with fulminant hepatitis regained consciousness within 1 week and recovered completely. Seven patients with subacute hepatitis died within 2 weeks after the onset of hepatic coma. In the period from 1958 to 1969, 20% of patients with liver cirrhosis with the acute type of liver failure recovered from the coma, and in the period from 1970 to 1975, 45% of patients recovered. Seven of 10 patients with the chronic type of hepatic failure died between 4 months and 9 yr after the onset of coma. Three other patients are still alive. The median survival time was 2.5 yr. Nine patients with primary liver carcinoma and liver coma were hospitalized from 1958 to 1969 and 24 from 1970 to 1975. The hepatorenal syndrome was present in 31 of 71 examined patients. Twenty-three patients with the hepatorenal syndrome were hospitalized in the period from 1970 to 1975. These results suggest that the complication rate in primary liver carcinoma and the frequency of the hepatorenal syndrome in patients with liver coma have increased during the last few years.

5652 CHARACTERISTICS OF HEPATIC COMA IN CHRONIC LIVER DAMAGE IN THE ELDERLY.

(Rus.) Postovit, V. A.; Osipov, L. N.; Zhurkin, A. T. (Leningrad Inst. Pediatrics, Leningrad, USSR). *Klin. Med. (Mosk.)* 55(11):81-84; 1977.

Clinical manifestations of hepatic coma were studied in 22 young and mature patients (18-44 yr, group 1) and in 37 elderly patients (60-89 yr, group 2) with clinically confirmed cirrhosis and chronic hepatitis. The duration of the comatose period was significantly greater in group 2 than in group 1 (27.0% of group 2 had coma lasting >10 days, compared with 9.0% of group 1, $p<0.05$). Hepatomegaly was detected in 40.5% of the patients in group 2, compared with only 14.0% of group 1 ($p<0.05$), while 54.5% of the patients in group 1 had splenomegaly, compared to 24.3% in group 2 ($p<0.05$). All patients died and postmortem examination showed a high incidence of concomitant complications: gastrointestinal hemorrhage (12 in group 1 and 10 in group 2), pneumonia (17 and 11, resp.), intestinal phlegmona (6 and 4, resp.), and ascites and peritonitis (5 and 3, resp.).

5653 DEFEROXAMINE-CHELATABLE IRON IN HEMOCHROMATOSIS AND OTHER DISORDERS OF IRON OVERLOAD.

(Eng.) Baldus, W. P.; Fairbanks, V. F.; Dickson, E. R.; Baggenstoss, A. H. (Mayo Clinic, Rochester, MN). *Mayo Clin. Proc.* 53(3):157-165; 1978.

Deferoxamine-chelatable iron was measured in 103 patients with known or suspected iron overload, and in 16 healthy controls to provide a more precise estimate of radiation dosage. All of 34 patients with untreated hemochromatosis had distinctly elevated values for deferoxamine-chelatable iron. The mean value in these cases (2,565 ± 210.6

μg/kg) was significantly greater than that in the 20 patients with cirrhosis (505 ± 57.9 μg/kg, $p<0.01$), who had little or no stainable hepatic iron. In 15 patients with hemochromatosis who were tested sequentially during the course of phlebotomy therapy, deferoxamine-chelatable iron proved a reliable index of the degree of reduction of storage iron. In 22 additional patients with partially treated hemochromatosis and 14 with iron overload accompanying chronic anemia, this test correlated well with the magnitude of iron deposits in liver or bone marrow; the chelatable iron levels in these patients were 1,718 ± 323.9 and 949 ± 161.8 μg/kg, resp. In 13 patients with unexplained elevations of serum iron, normal or only slightly elevated deferoxamine-chelatable iron (482 ± 98.7 μg/kg) correctly indicated that storage (hepatic) iron was not excessive. The test was more reliable than was determination of serum iron or transferrin saturation as an indicator of increased storage iron. Elevated values could not be attributed to disturbed liver function. Determination of deferoxamine-chelatable iron is a safe, practical, and useful procedure for identifying persons with increased iron stores and for assessing the effect of phlebotomy therapy.

5654 CLINICAL POLYMORPHISM AND VARIANTS OF CERULOPLASMIN IN HEPATOLENTICULAR DEGENERATION. (Rus.) Vakharlovskii, V. G.; Moshkov, K. A.; Shavlovskii, M. M.; Neifakh, S. A. (Res. Inst. Experimental Medicine, Leningrad, USSR). *Genetika* 13(7):1294-1304; 1977.

To evaluate possible associations between the clinical polymorphism of hepatolenticular degeneration (Wilson's disease) and the structure of ceruloplasmin (CP), eight patients with Wilson's disease underwent extensive clinical and physicochemical examinations. All patients had a decreased blood level of CP (4.7-25.4 mg%, compared to 30 mg% in controls) and an elevated urinary excretion of CU (116-900 μg/day, instead of the normal 59.0 μg/day). Treatment with penicillamine resulted in clinical improvement, although the therapeutic doses and efficacy of treatment varied from patient to patient. At least two clinical variants of Wilson's disease were recognized: one with and one without visceral manifestations prior to the development of typical neurological symptoms. Analysis of the peptide maps of CP specimens showed distinct differences in peptide spectrum between the patients with different clinical variants of disease.

5655 DO LIVER TESTS PREDICT LIVER PATHOLOGY [Abstract]? (Eng.) Galambos, J. T.; Wills, C. (Emory Univ. Sch. Medicine, Atlanta, GA). *Gastroenterology* 72(5, Part 2):1060; 1977.

5656 COMPARISON OF ABDOMINAL SONOGRAM AND ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY IN THE DIAGNOSIS OF PANCREATIC AND BILIARY DISEASES [Abstract]. (Eng.) Lifton, L. J.; Kuskin, L. F. (Harrisburg Polyclinic Hosp., Harrisburg, PA). *Gastroenterology* 72(5, Part 2):1089; 1977.

5657 USEFULNESS OF PLASMA AMINO ACID MEASUREMENTS FOR ESTABLISHING ALCOHOLISM AS A CAUSE OF ABNORMAL LIVER CHEMISTRIES [Abstract]. (Eng.) Shaw, S.; Lue, S. L.; Lieber, C. S. (Bronx Veterans Admin. Hosp., Bronx, NY). *Gastroenterology* 72(5, Part 2):1171; 1977.

5658 PEDIATRIC GASTROENTEROLOGY 1/1/69-12/31/75: A REVIEW. PART II. THE LIVER AND BILIARY TRACT. (Eng.) Finley, A.; Andorsky, M.; Davidson, M. (Bronx-Lebanon Hosp. Center, 1650 Grand Concourse, Bronx, NY 10457). *Am. J. Dig. Dis.* 22(2):155-167; 1977.

5659 LIVER CELL ADENOMA AND HEPATIC HAMARTOMA--RECOGNITION, SIGNIFICANCE AND SURGICAL TREATMENT [Abstract]. (Eng.) Langer, B.; Stone, R. M.; Phillips, M. J.; Colapinto, R. F. (Dept. Surgery, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1086; 1977.

5660 PATHOGENESIS OF LIVER CANCER. A NEW CONCEPT [Abstract]. (Eng.) Medline, A.; Solt, D.; Ogawa, K.; Farber, E. (Dept. Pathology, Univ. Toronto, Toronto, Ontario, Canada). *Gastroenterology* 72(5, Part 2):1172; 1977.

5661 CARCINOMA OF THE AMPULLA OF VATER: REVIEW OF 57 CASES [Abstract]. (Eng.) Lucke, D.; Schlippert, W.; Christensen, J.; Anuras, S. (Univ. Hosp., Iowa City, IA). *Gastroenterology* 72 (5, Part 2):1170; 1977.

5662 MEASUREMENT OF PRIMARY CONJUGATED BILE ACIDS IN THE SERA OF PATIENTS WITH LIVER NEOPLASM [Abstract]. (Eng.) Levy, N.; Mihas, A. A.; Hirschowitz, B. I. (Div. Gastroenterology, Univ. Alabama, Birmingham AL 35294). *Gastroenterology* 72(5, Part 2):1089; 1977.

5663 ALPHA-ANTITRYPSIN LEVELS IN PATIENTS WITH METASTATIC CARCINOMA OF THE LIVER [Abstract]. (Eng.) Setty, N.; Dubin, A.; Dourdourekas, D.; Steigmann, F. (Cook County Hosp., Chicago, IL). *Gastroenterology* 72(5, Part 2):1170; 1977.

5664 CUTANEOUS AND HEPATIC HAEMANGIOMATA. (Eng.) Robinson, D.; Hambleton, G. (Hammersmith Hosp., 150 Du Cane Rd., London W12 OHS, England). *Arch. Dis. Child* 52(2):155-157; 1977.

5665 ULTRASTRUCTURAL CHANGES IN HUMAN CHOLESTASIS: DIFFERENCIATION [sic] PROCESS OF THE LATERAL MEMBRANES OF HEPATOCYTES [Abstract]. (Eng.) Santalices, L.; Glasinovic, J. C.; Valdiviso, V. (Lab. Histology, Universidad Catolica, Santiago, Chile). *Gastroenterology* 72(5, Part 2): 1126; 1977.

5666 ASANGUINEOUS HYPOTHERMIC TOTAL BODY WASH-OUT (TBW) [Abstract]. (Eng.) Tobias, H.; Ackert, J.; Isom, W. (New York Univ. Sch. Medicine, New York, NY). *Gastroenterology* 72(5, Part 2):1174; 1977.

5667 EMERGENCY TREATMENT OF ACUTE PORTAL-SYSTEMIC ENCEPHALOPATHY (PSE) WITH LACTULOSE ENEMAS: A CONTROLLED STUDY [Abstract]. (Eng.) Demeulenaere, L.; Van Waes, L.; van Egmond, J. (Dept. Medicine, St. Andriesklinìek, Tielt, Belgium). *Gastroenterology* 72(5, Part 2):1174; 1977.

5668 CORRELATION OF PLASMA TAURINE LEVELS WITH GRADES OF HEPATIC ENCEPHALOPATHY (HE) IN MAN [Abstract]. (Eng.) Rossi-Fanelli, F.; Capocaccia, L.; Fischer, J. E. (Dept. Medicine, Univ. Rome, Rome, Italy). *Gastroenterology* 72(5, Part 2):1181; 1977.

5669 POLYACRYLONITRILE MEMBRANE DIALYSIS FOR HEPATIC COMA [Abstract]. (Eng.) Ware, A.; Quarto di Palo, F.; Buccianti, G.; Polli, E. E. (Southwestern Medical Sch., Dallas, TX 75235). *Lancet* 2(8035):451-452; 1977.

5670 LIVER FAILURE WITH ALCOHOLIC-LIKE HYALINE AFTER JEJUNOILEAL BYPASS--REVERSAL BY PARENTERAL NUTRITION AND REANASTOMOSIS [Abstract]. (Eng.) Baker, A. L.; Elson, C. O.; Driscoll, R. H.; Boyer, J. L. (Dept. Medicine, Univ. Chicago, Chicago, IL). *Gastroenterology* 72(5, Part 2): 1170; 1977.

5671 PERICENTRAL HEPATIC FIBROSIS IN DIABETES MELLITUS [Abstract]. (Eng.) Falchuk, K. R.; Fiske, S.; Trey, C.; Haggitt, R.; Federman, M. (New England Deaconess Hosp., Boston, MA). *Gastroenterology* 72(5, Part 2):1174; 1977.

5672 FURTHER METABOLIC AND ENZYME STUDIES IN FAMILIAL HEPATIC GLYCOGEN SYNTHETASE (GS) DEFICIENCY [Abstract]. (Eng.) Aynsley-Green, A.; Williamson, D. H.; Gitzelmann, R. (Univ. Oxford, Oxford, England). *Pediatr. Res.* 11(9, Part 2):1015; 1977.

5673 HEPATITIS TRANSMISSION BY CEA POSITIVE BLOOD [Abstract]. (Eng.) Molnar, I. G.; Gitnick, G. L. (Univ. California, Los Angeles, CA). *Gastroenterology* 72(5, Part 2):1103; 1977.

5674 DIAGNOSIS AND MANAGEMENT OF HEPATIC TRAUMA. (Eng.) Mattox, K. L. (Baylor Coll. Medicine, Houston, TX). *Hosp. Med.* 13(3): 92-95, 98-100; 1977.

5675 SEX-LINKED NON-WILSONIAN COPPER STORAGE IN CHILDHOOD [Abstract]. (Eng.) Schnei-Saunders, F. C.; Ashwal, S. (No affiliation given). *Ann. Neurol.* 2(3):262; 1977.

See also, 5087, 5227, 5229, 5238, 5309, 5310, 5311, 5332, 5333, 5335, 5336, 5337, 5338, 5347, 5349, 5350, 5368, 5369, 5370, 5372, 5373, 5374, 5375, 5508, 5599, 5694, 5699, 5701, 5707, 5727, 5729, 5736, 5737, 5744, 5748, 5776, 5780, 5811, 5813, 5834, 5836.

LIVER AND BILIARY TRACT

Hyperbilirubinemic States

5676 ELECTRORETINOGRAPHY IN NEONATES TREATED WITH PHOTOTHERAPY. (Eng.) Bhupathy, K.; Sethupathy, R.; Pildes, R. S.; Constantaras, A. A.; Fournier, J. H. (Cook County Hosp., Chicago, IL). *Pediatrics* 61(2):189-192; 1978.

To evaluate the possible retinotoxic effects of phototherapy given in the neonatal period, electroretinographic (ERG) studies were carried out in 22 normal control neonates and 28 neonates who had had phototherapy with ocular shielding during the first few days of life. The mean age of ERG testing was 16.8 ± 2.9 days in the phototherapy group and 16.4 ± 3.7 days in the controls. The results of routine funduscopy were normal in both groups. Amplitudes of a and b waves under dark- and light-adapted states were similar in both groups. Phototherapy does not appear to have deleterious effects on photopic and scotopic retinal function in infants whose eyes are adequately shielded.

5677 NEONATAL JAUNDICE IN GREEK IMIGRANTS [Letter to Editor]. (Eng.) Valaes, T.; Drew, J. H.; Kitchen, W. H. (Tufts-New England Medical Center Hosp., Boston, MA 02111). *J. Pediatr.* 91(6):1030-1032; 1977.

See also, 5207, 5211.

LIVER AND BILIARY TRACT

Nonviral Hepatitis and Hepatic Injury

5678 HEPATIC INJURY AND DRUG METABOLISM IN PATIENTS WITH ALPHA-METHYLDOPA-INDUCED LIVER DAMAGE. (Eng.) Sotaniemi, E. A.; Hokkanen, O. T.; Ahokas, J. T.; Pelkonen, R. O.; Ahlqvist, J. (Dept. Internal Medicine, Univ. Oulu, SF-90220 Oulu 22, Finland). *Eur. J. Clin. Pharmacol.* 12(6): 429-435; 1977.

The clinical picture and drug metabolism in 36 consecutive patients with alpha-methyldopa-induced liver injury and 11 controls were investigated. The diagnosis was based on case history and biochemical, histological, and follow-up studies after drug withdrawal. Alpha-methyldopa-induced liver damage was found to occur in two phases, acutely within months (3.4 ± 0.4 months) or chronically within years (36.5 ± 2.9 months, $p<0.001$) after beginning treatment. Differences were also found in clinical symptoms and the results of liver tests on the patients if they were divided on the basis of the time factor. Drug metabolism was impaired in patients with alpha-methyldopa-induced liver damage, as indicated by low cytochrome P-450 level in liver biopsies (5.7 ± 0.73 versus 10.6 ± 5 nmol/g in controls, $p=0.001$) and prolonged antipyrine elimination rate from plasma ($T_{1/2}=14.2 \pm 1.18$ hr versus 8.8 ± 0.5 hr in controls). Disappearance of the symptoms and normalization of the liver tests after drug withdrawal occurred faster in patients with an acute type of hepatotoxicity than in subjects with delayed onset of the symptoms. The occurrence of hepatotoxicity in four members of a family suggests a genetic disposition to alphamethyldopa-induced hepatic injury. The occurrence of two phases of liver damage suggests that a possible mechanism for acute hepatotoxicity might be an allergic reaction to metabolic intermediates produced during breakdown of alpha-methyldopa in the liver. For cases of delayed onset, the cause might be increasing damage to microsomal liver protein due to covalent binding during long-term exposure to the drug.

5679 ASPIRIN HEPATOTOXICITY. (Eng.) Kanada, S. A.; Kolling, W. M.; Hindin, B. I. (16269 Sierra Ridge Way, Hacienda Heights, CA 91745). *Am. J. Hosp. Pharm.* 35(3):330-336; 1978.

A case of aspirin hepatotoxicity in a 46-yr-old man with rheumatoid arthritis is presented. The patient was started on 900 mg aspirin q.i.d.; 5 days later, the dose was increased to 1,200 mg q.i.d. After 6 days of 4.8 g aspirin/day, the serum salicylate level rose to 25 mg/100 ml, and liver enzymes became elevated. Aspirin was discontinued, and ibuprofen (600 mg q.i.d.) was begun. Eight days after the cessation of aspirin therapy, the patient's liver enzyme values returned to normal. This case and others in the literature suggest that aspirin-induced hepatotoxicity occurs much more frequently in patients with rheumatoid arthritis and other connective tissure disorders than has been previously recognized.

5680 SCINTIGRAPHY OF LIVER AND SPLEEN IN VINYL CHLORIDE WORKERS. (Eng.) Biersack, H. J.; San Luis, T., Jr.; Lange, C. E.; Thelen, M.; Veltman, G.; Winkler, C. (Institut fur klinische und experimentelle Nuklearmedizin, 5300 Bonn-Venusberg, W. Germany). *Acta Hepatogastroenterol. (Stuttg.)* 24(5):357-361; 1977.

In 152 vinyl chloride (VC)-exposed workers of whom 124 were employed in polyvinyl chloride (PVC) production and 28 in VC processing plants, liver and spleen imaging was performed using ^{99m}Tc-sulfur colloid and ^{197}Hg-BMHP, to test this procedure as a noninvasive screening method for liver disease resulting from PVC exposure. In 101/124 workers in the PVC production plant and in 18/28 workers in VC processing factories, pathological liver and spleen scintigrams were found. The most frequent scintigraphic change was an increase in splenic colloid accumulation, when compared with the liver uptake. Three angiosarcomas of the liver were detected through circumscribed defects of colloid accumulation. Sequential liver scintigraphy was carried out in 15 cases. In seven patients with esophageal varices, considerable decrease in portal venous blood flow was demonstrated. This study suggests that scintigraphically detectable changes are sensitive indicators of VC induced hepatic lesions, including liver fibrosis, portal hypertension, and angiosarcoma.

5681 THE LIVER AND INDUSTRIAL POISONS. CLINICAL AND BIOLOGICAL ASPECTS. (Fre.) Efthymiou, M. L. (Hopital Fernand Widal, 200, rue du Faubourg Saint-Denis, 75010 Paris, France). *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 38(1/2): 237-257; 1977.

5682 DETECTION OF HEPATOBILIARY DISEASES IN INDUSTRIAL MEDICINE. (Fre.) Jouanneau, C. (Service scientifique, Boehringer Mannheim, France S.A., 7, boulevard de la Madeleine, 75001 Paris, France). *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 38(1/2):273-274; 1977.

LIVER AND BILIARY TRACT

Acute Viral Hepatitis

5683 VIRAL HEPATITIS: ADVANCES, PROSPECTS, DOUBTS, AND PROBLEMS. (Rus.) Ananiev, V. A.; Stakhanova, V. M.; Zhdanov, V. M. (D. I. Ivanovskii Inst. Virology, Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (9):3-6; 1977.

Various problems pertaining to the etiology of viral hepatitis are discussed. Discovery of the Australia antigen (HBsAg) and development of various assays for its identification markedly reduced the risk of infection by post-transfusion hepatitis. The use of true tissue chimeras (cultivation of the infected human tissues on the chorioallantoic membrane of the chick embryo) revealed the presence of HBsAg in 24/49 patients with viral hepatitis, 11/21 blood donors, 1/1 patient with acute respiratory disease, and 2/3 patients with chronic renal insufficiency. Further research and development of sophisticated analytical assays are necessary to understand the nature of HBsAg.

5684 DETECTION OF ATYPICAL FORMS OF VIRAL HEPATITIS BY DETERMINATION OF LACTATE DEHYDROGENASE ISOENZYMES. (Rus.) Tsarapkin, M. I. (No affiliation given). *Vrach. Delo* (7):145-148; 1977.

To improve the differential diagnosis of anicteric viral hepatitis, the activities of lactate dehydrogenase (LDH) isozymes were determined (by electrophoresis in agar gels) in 380 patients with the provisional diagnoses of functional gastric disturbance (116), acute gastritis (74), chronic gastritis (96), food poisoning (9), relapse of chronic cholecystitis (42), acute enterocolitis (14), chronic enterocolitis (8), catarrhal angina (6), and chronic tonsillitis (15). Of these patients, 26/380 had increased activity of LDH5 (22.0%, compared with 9.7% in healthy controls); 22/26 patients also had increased activity of LDH4 (14.5%, compared to 8.3% in controls). Further examination showed that 14/26 patients with increased LDH5 activity had an atypical variant of viral hepatitis, and 3/26 had the anicteric variant of virus hepatitis.

5685 PATHOGENESIS AND TREATMENT OF SEVERE FORMS OF VIRAL HEPATITIS IN CHILDREN. (Rus.) Nisevich, N. I.; Uchaikin, V. F. (N. I. Pirogov Second Medical Inst., Moscow, USSR). *Vestn. Akad. Med. Nauk SSSR* (9):35-42; 1977.

To evaluate the role of metabolic processes in the pathogenesis of massive necroses and hepatic coma in viral hepatitis, various groups of children with severe forms of viral hepatitis underwent extensive biochemical examination. Lipid peroxidation was studied in 112 patients (24 had severe form, 54 had medium severity of disease, and 34 had mild hepatitis). The evaluation of the malonic dialdehyde content was proportional to the severity of disease (the patients with mild hepatitis showed 2.1-fold increase compared with 5.6-fold increase in the patients with severe hepatitis). The state of the lysosomal and proteolysis apparatus was studied in 193 patients (36 had severe disease). Development of hepatic coma in the patients with hepatodystrophy was associated with the increased activity of trypsin-like proteinases and, subsequently, with increased formation of active kinins. Analysis of 153 patients revealed the presence of antibodies against liver in the serum of 60% of the patients, antibodies against kidney tissue in 21.7% of the patients, and antibodies against smooth muscles in 26.4% of the patients; the titers of organ antibodies decreased with the severity of disease (antibodies could not be detected during coma).

5686 HEPATITIS B IN CHILDREN. I. ANALYSIS OF 80 CASES OF ACUTE AND CHRONIC HEPATITIS B. (Eng.) Dupuy, J. M.; Kostewicz, E.; Alagille, D. (INSERM, Hopital d'Enfants, 94270 Bicetre, France). *J. Pediatr.* 92(1):17-20; 1978.

To study the natural course of hepatitis B uncomplicated by liver disorders of other causes, the transmission, clinical features, and presence of hepatitis B surface antigen (HBsAg) and antibody (anti-HBs) were investigated in 80 children who had hepatitis B between 1971 and 1975. The diagnosis was based upon the detection in serum of HBsAg and/or the secondary occurence of anti-HBs. Thirty-one patients presented with acute viral hepatitis, 16 with severe or fulminant hepatitis, 17 with chronic persistent hepatitis, 12 with chronic active hepatitis, and 4 were asymptomatic chronic carriers of HBsAg. Twenty-nine of 80 children were under 1 yr of age, the peak of frequency occurring from 2 to 5 months. HBsAg was detected in the serum at the onset of the disease in 12/16 patients with severe hepatitis, and 10/16 died. The source of infection, determined in 27 of 29 infants, was administration of blood derivatives in 15 cases and contact with an HBsAg-carrier mother in 9 instances. In the latter type, the incubation time (103 days) was compatible with a p.o. route of infection. Persistent antigenemia occurred in only 3 of 29 patients. The overt type of disease developed by most infants, as well as the small number of patients who became HBsAg carriers, suggest that the carrier state, often encountered in neonatally infected infants in other countries, may be related to environmental or genetic factors rather than to immaturity of the immune system.

5687 HEPATITIS B IN CHILDREN. II. STUDY OF CHILDREN BORN TO CHRONIC HBsAg CARRIER MOTHERS. (Eng.) Dupuy, J. M.; Giraud, P.; Dupuy, C.; Drouet, J.; Hoofnagle, J. (INSERM, Hopital d'Enfants, 94270 Bicetre, France). *J. Pediatr.* 92(2):200-204; 1978.

The apparently high rate of hepatitis B transmission but low rate of developing the chronic carrier state of hepatitis B surface antigen (HBsAg) among infants born to chronic HBsAg carriers prompted a prospective study of infants born to chronic carriers who were detected in a routine HBsAg screening program. A survey of 4,452 pregnant women revealed 28 asymptomatic chronic carriers. At birth, 16 of 17 infants studied were HBsAg-negative whereas antibody to hepatitis B core antigen (anti-HBc) was present in all patients at a titer similar to that of the mother. Twelve children were followed for 6 to 18 months. In four of them, HBsAg remained negative and anti-HBc titers progressively decreased and were undetectable when tested after the age of 6 months. In eight infants, HBsAg became positive after an average of 48 days. Elimination of HBsAg occurred in seven infants; five of them had clinical and biological manifestations of mild hepatitis. Sequential determinations of total complement (C) and C components in three patients in the latter group showed depression of complement at the time that clinical manifestations appeared. In the patient who became an HBsAg carrier, as well as in three infants who remained HBsAg-negative, no decrease in complement titers was observed. These results indicate that vertical transmission from carrier mothers can occur in a low prevalence area and that neonatally infected children are capable of active elimination of the hepatitis B virus.

5688 EPIDEMIOLOGY OF HEPATITIS B SURFACE ANTIGEN (HBsAg) AND ANTIBODY TO HBsAg IN HOSPITALIZED PERSONNEL.

(Eng.) Janzen, J.; Tripatzis, I.; Wagner, U.; Schlieter, M.; Muller-Dethard, E.; Wolters, E. (Medizinische Hochschule Hannover, Karl-Wiechert-Allee 9, D-3000 Hannover 61, W. Germany). *J. Infect. Dis.* 137(3):261-265; 1978.

The epidemiology of hepatitis B in hospital personnel was studied by testing sera from 3,770 employees of the Hannover Medical School for hepatitis B surface antigen (HBsAg) and its antibody (anti-HBs) by solid-phase radioimmunoassay. An overall prevalence of 2.2% for HBsAg and 11.7% for anti-HBs was found. Physicians (18.2%), nurses (20.1%), and members of the cleaning service (26.3%) showed the highest frequencies of HBsAg or anti-HBs carriage. In a study of age- and sex-matched personnel, nurses showed a significantly ($p<0.01$) higher rate of infection than did a control group with less exposure to infectious materials. The frequency of HBsAg or anti-HBs was highest in persons associated with dialysis (31.3%), anesthesiology (31.0%), ophthalmology (29.4%), neurosurgery (28.0%), and surgery (24.4%). The rate of infection was significantly ($p<0.01$) higher in surgical departments (24.4%) than in nonsurgical ones (13.3%). Persons who had been nursing patients with hepatitis were significantly ($p<0.05$) more frequently carriers of HBsAg or anti-HBs than was a comparable control group. There was a correlation between the prevalence of HBsAg and age: of the personnel who were 20 yr old or younger, only 4.1% were HBsAg or anti-HBs carriers, whereas 37.2% of those 51 yr or older were HBsAg or anti-HBs carriers ($p<0.001$). The members of medical professions showed a rate 1.5% higher than that for the total personnel. The high rate of infection in the cleaning service may be related to the fact that this group had the oldest persons (average age, 38.6 yr), and the low infection rate seen in medical technicians (11.1%) may be related to their young age (28.2 yr). Low rates observed in medical students (10.8%), student nurses (5.3%), and student technicians (6.7%) can be explained by their age and less intensive exposure.

5689 CHARACTERISTICS OF BLOOD CLOTTING IN CHOLESTATIC FORMS OF VIRAL HEPATITIS.

(Rus.) Fedenko, Iu. I. (Voroshilovgrad Municipal Hosp. No. 4, Voroshilovgrad, USSR). *Klin. Med. (Mosk.)* 45(10):76-82; 1977.

The state of blood clotting was studied in 104 patients with various forms of viral hepatitis. The patients were divided into three groups: group 1 included 43 patients with typical viral hepatitis, group 2 included 42 patients with hepatitis with a cholestatic component, and group 3 included 9 patients with a cholestatic variant of viral hepatitis. The patients in groups 1 and 2 had marked hypocoagulation due to decreased level of procoagulants and increased activity of anticoagulants; these changes were more pronounced during the acute period of disease (fibrinolytic activity in groups 1 and 2 was 212.0 ± 5.3 min and 206.9 ± 15.5 min compared to 300.0 ± 7.7 min in healthy controls, $p<0.001$). The acute period of cholestatic hepatitis was not associated with disturbances in blood clotting, although prolonged cholemia induced changes similar to those in groups 1 and 2.

5690 OCCURRENCE OF COLD-REACTIVE ANTILYMPHOCYTE ANTIBODIES IN ACUTE VIRAL HEPATITIS.

(Eng.) Marchesini, G.; Forlani, G.; Pisi, E. (Istituto di Patologia Medica I, Universita de Bologna, Policlinico S. Orsola, Via Massarenti 9, 40138 Bologna, Italy). *Rend. Gastroenterol.* 9(3):185-188; 1977.

The presence of cold-reactive antibodies directed against membrane antigen(s) of normal non-B lymphocytes was investigated in hepatitis B surface antigen (HBsAg)-positive and -negative acute viral hepatitis (AVH). The number of surface Ig-positive cells from six healthy donors with different histocompatibility antigens was evaluated after incubation with test sera or saline as control. Fifteen of 19 HBsAg-positive and 14 of 17 HBsAg-negative AVH sera, obtained at onset of the disease, were positive for the presence of antibodies reacting with surface antigens of lymphocytes, as were about 40% of the sera obtained when serum bilirubin and SGPT had returned to normal levels. Cold-reactive antilymphocyte antibodies probably account for the known lymphocytotoxic activity of AVH sera, as demonstrated in other viral infections.

5691 TYPE B HEPATITIS AFTER NEEDLE-STICK EXPOSURE: PREVENTION WITH HEPATITIS B IMMUNE GLOBULIN. FINAL REPORT OF THE VETERANS ADMINISTRATION COOPERATIVE STUDY.

(Eng.) Seeff, L. B.;

Wright, E. C.; Zimmerman, H. J.; Alter, H. J.; Dietz, A. A.; Felsher, B. F.; *et al.* (Veterans Admin. Hosp., 50 Irving St. NW, Washington, DC 20422). *Ann. Intern. Med.* 88(3):285-293; 1978.

In a randomized, double-blind trial, the relative efficacies of hepatitis B immune globulin (HBIG) and immune serum globulin (ISG) in preventing type B hepatitis after needle-stick exposure to hepatitis B surface antigen (HBsAg) were analyzed. The HBsAg-exposed subjects received a 5-ml i.m. injection of either HBIG (anti-HBs titer of 1:100,000 by passive hemagglutination), or of ISG (anti-HBs titer <1.8). Clinical hepatitis developed in 1.4% of the 216 subjects who received HBIG and in 5.9% of 203 ISG recipients (p=0.016), and seroconversion (anti-HBs) occurred in 5.6% and 20.7% of them, resp. (p<0.001). Mild and transient side-effects were noted in 3.0% of ISG and in 3.2% of HBIG recipients. Available donor sera were examined for DNA polymerase (DNAP) and e antigen and antibody (HBeAg; anti-HBe). Both DNAP and HBeAg showed a highly significant correlation with the infectivity of HBsAg-positive donors; type B hepatitis and all type B events occurred more frequently in those exposed to DNAP-positive sera or to HBeAg-positive sera as opposed to negative sera (p=0.003). HBIG remained significantly superior to ISG in preventing type B hepatitis, even when the analysis was confined to these two high-risk subgroups (p=0.02). The efficacy of ISG in preventing type B hepatitis cannot be ascertained because a true placebo group was not included.

5692 TRANSMISSIBLE AGENT IN NON-A, NON-B HEPATITIS. (Eng.) Alter, H. J.; Holland, P. V.; Purcell, R. H.; Popper, H. (Natl. Inst. Health Clinical Center, Blood Bank Dept., Bethesda, MD 20014). *Lancet* 1(8062):459-465; 1978.

Plasma or serum from four patients with acute or chronic non-A, non-B post-transfusion hepatitis (PTH) and from a blood-donor implicated in two cases of PTH was inoculated into five chimpanzees in an effort to find a transmissible agent for this disease. Biochemical and histological evidence of hepatitis developed in all five chimpanzees but not in a control animal. The mean incubation period in the chimpanzees was 13.4 weeks, compared with 7.7 weeks in the four patients with PTH. The peak alanine aminotransferase (ALT) levels in the five chimpanzees were 265, 212, 219, 70, and 62 IU/l. Histological changes ranged from mild to conspicuous hepatitis and generally correlated with the degree of ALT elevation. There was no evidence of clinical disease, and all animals went on to biochemical and histological recovery. There was no serological evidence of type A or type B hepatitis. Hepatitis was transmitted by serum derived from patients with chronic as well as acute hepatitis, strongly suggesting a chronic carrier state for the agent responsible for non-A, non-B hepatitis. Non-A, non-B hepatitis thus seems to be due to a transmissible agent that can persist and remain infectious for long periods.

5693 TRANSFER FACTOR IN THE ATTEMPTED TREATMENT OF PATIENTS WITH HBsAg-POSITIVE CHRONIC LIVER DISEASE. (Eng.) Jain, S.; Thomas, H. C.; Sherlock, S. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Clin. Exp. Immunol.* 30(1):10-15; 1977.

To determine whether immunity to hepatitis B virus-related antigens can be restored or influenced by the administration of transfer factor (TF), six patients with hepatitis B surface antigen-positive (HBsAg-pos) chronic liver disease were treated with TF prepared from WBC of normal blood donors without history of hepatitis (nonspecific TF) and with TF from subjects recently recovered from type B hepatitis (specific TF). In three patients, there were transient elevations of aspartate transaminase (AsT) after specific TF, representing damage or destruction of hepatocytes, and in two of these patients there was coincidental complement consumption, suggesting that TF had stimulated production of antibody. In one other patient there was an increase in E-rosetting lymphocyte concentration, representing a change in T-lymphocyte reactivity. One of the two patients who had no measured response to TF had a primary liver cell carcinoma and was receiving prednisolone therapy. TF prepared from subjects who have recently recovered from type B hepatitis may have temporarily altered the immunological status of patients with HBsAg-pos chronic liver disease, but it did not have a beneficial therapeutic effect.

5694 HEPATITIS B ANTIGEN AND THE LIVER. (Eng.) Mihas, A. A.; Conrad, M. E. (Dept. Medicine, Univ. Alabama Birmingham, Birmingham, AL 35294). *Medicine* 57(2):129-150; 1978.

Studies involving the morphology, biophysical properties, detection, epidemiology, and carrier state of the hepatitis B surface antigen (HBsAg), and its relationship to liver diseases and to other antigen-antibody systems are reviewed. Antigens that have been associated with hepatitis type B include both HBsAg and a core antigen (HBcAg). Antigenic subtypes of HBsAg have been identified and are useful in epidemiologic studies; the presence of "e" antigen may be associated with the development of chronic liver disease. Blood and other biologic fluids containing HBsAg transmit hepatitis type B by parenteral and nonparenteral routes. Carriers of HBsAg are more prevalent in lower socioeconomic groups. The carrier state is more common following anicteric hepatitis, and this may be related to the carriers' inability to develop a cellular immune response. Persistence of HBsAg has been related to polyarteritis, glomerulonephritis, cirrhosis, chronic active hepatitis, and hepatoma. However, the majority of carriers of HBsAg are asymptomatic. Elimination of HBsAg carriers as blood donors has markedly diminished transmission of hepatitis B by transfusion, so that other viral agents are now the most important cause of post-transfusion hepatitis. The prophylactic administration of human serum gamma globulin-containing antibody to HBsAg seems to decrease the occurrence of hepatitis type B following nonparenteral exposure. There is no convincing evidence that it decreases occurrence following parenteral exposure. Preliminary studies indicate that active immunization is feasible and would provide a safe and effective method of preventing hepatitis type B transmission and its complications.

5695 DETERMINATION OF VIRAL HEPATITIS B ANTIGEN IN LIVER AND PERIPHERAL BLOOD IN CHRONIC LIVER DISEASES. (Rus.) Loginov, A. S.; Aruin, L. I.; Tsaregorodtseva, T. M.; Gorodinskaia, V. S.; Zotina, M. M.; Tkachev, V. D. (Central Res. Inst. Gastroenterology, Moscow, USSR). *Ter. Arkh.* 50(2): 32-36; 1978.

The incidence of viral hepatitis B antigen (HBAg) in the liver tissue and peripheral blood was studied in 98 patients with various chronic liver lesions. HBAg in liver specimens obtained at biopsy was assayed by staining with orsein dye; serum HBAg was assayed by immunoelectrophoresis and double immunodiffusion. Orsein-positive hepatocytes were observed in 7/22 patients with cirrhosis, 4/21 patients with active hepatitis, 0/7 patients with persistent hepatitis, 0/4 patients with posthepatitis state, 0/5 patients with reactive hepatitis, 0/9 patients with fatty dystrophy, 0/22 patients with lipofuscinosis, and 1/1 patient with cancer of the bile duct. In 70% of the patients (predominantly those with cirrhosis or active hepatitis), persistence of HBAg in the blood serum coincided with the presence of antigen-containing hepatocytes.

5696 T-LYMPHOCYTE CYTOTOXICITY TO HBsAg-COATED TARGET CELLS IN HEPATITIS B VIRUS INFECTION. (Eng.) Alberti, A.; Realdi, G.; Bortolotti, F.; Rigoli, A. M. (Istituto di Medicina Clinica, Cattedra di Patologia Medica, via Giustiniani 1, 35100 Padova, Italy). *Gut* 18(12):1004-1009; 1977.

The cytotoxic effect of peripheral lymphocytes on chicken RBC (ChRBC) coated with purified hepatitis B surface antigen (HBsAg) was studied as an *in vitro* parameter of cell-mediated immunity in acute and chronic infection with hepatitis B virus. Using this technique, the mean cytotoxic index of lymphocytes from 23 patients with acute hepatitis B (29.13 ± 20.88) was significantly higher than that obtained with lymphocytes from 15 controls (6.53 ± 3.75, $p<0.001$). Only 33.3% of the 12 patients with HBsAg-positive chronic active hepatitis exhibited lymphocyte cytotoxicity to HBsAg-coated target cells, and the mean cytotoxic index (11.66 ± 6.60) was in these cases significantly lower than that found in acute hepatitis B ($p<0.005$). All 10 healthy chronic carriers of HBsAg failed to show lymphocyte cytotoxicity to target cells. The effector cells detected in acute hepatitis B by this *in vitro* assay were demonstrated to be T-lymphocytes, as T-cell depleted subpopulations lacked cytotoxic activity. Target cell lysis was blocked by the addition of HBsAg-coated unlabeled ChRBC as well as of purified HBsAg in the culture tubes. It is suggested that damage to the liver cells in acute hepatitis B is related to the presence of cytotoxic T-lymphocytes reacting with HBsAg on the surface of infected hepatocytes. An inadequate lymphocyte response to the antigen may be responsible for the persistence of the infection in the liver with varied clinical manifestations and associated hepatic lesions.

5697 ANTI-HBc, HBeAg AND DNA POLYMERASE ACTIVITY IN HEALTHY HBsAg CARRIERS AND PATIENTS WITH INFLAMMATORY LIVER DISEASES. (Eng.) Arnold, W.; Hess, G.; Purcell, R. H.; Kaplan, P. M.; Gerin, J. L.; Meyer zum Buschenfelde, K. H. (Freie Universitat Berlin, Klinikum Charlottenburg, Spandauer Damm 130, D-1000 Berlin 19, W. Germany). *Klin. Wochenschr.* 56(6):297-303; 1978.

Antibody titers to hepatitis B core antigen (anti-HBc) were analyzed in healthy hepatitis B surface antigen (HBsAg)-carriers and patients with chronic inflammatory diseases. In addition, the relationships between the presence of hepatitis B e antigen (HBeAg) and DNA polymerase activity and the presence of inflammatory liver disease or the HBsAg carrier state, anti-HBc titers in the serum, and intracellular HBsAg were investigated in healthy HBsAg-carriers and patients with HBsAg-positive inflammatory liver diseases. Thirty-two of 44 patients with acute virus B hepatitis were negative for anti-HBc in the first week of the disease. Anti-HBc-titers in healthy HBsAg-carriers varied between 1:10 and 1:32,000 (medium titer 1:4,000). In HBsAg-positive chronic active hepatitis (CAH), a medium titer between 1:32,000 and 1:64,000 was found; in patients with chronic persistent hepatitis (CPH), a titer of about 1:16,000 was found. All autoimmune type CAH showed anti-HBc-titers less than 1:10. By immunofluorescence, HBcAg was demonstrated in 71 asymptomatic HBsAg-carriers but in none of the healthy HBsAg-carriers. In contrast, HBcAg was only found in four of five HBsAg-positive CAH and six of nine CPH patients. No elevated DNA polymerase activity was demonstrated in healthy HBsAg-carriers. Among 44 patients with virus B hepatitis, only 3 showed elevated DNA polymerase activity. On the other hand, DNA polymerase elevation was demonstrable in 17 of 37 cases of CAH and 9 of 15 with CPH. The investigations showed a strong correlation between the demonstration of serum HBcAg and the DNA polymerase activity. The characteristic findings enable differentiation between "healthy" HBsAg-carriers and HBsAg-carriers with inflammatory liver diseases.

5698 LOCALISATION OF e-ANTIGEN IN NUCLEI OF HEPATOCYTES IN HBsAg-POSITIVE LIVER DISEASE. (Eng.) Arnold, W.; Nielsen, J. O.; Hardt, F.; Meyer zum Buschenfelde, K. H. (Freie Universitat Berlin, Klinikum Charlottenburg, 1000 Berlin 19, W. Germany). *Gut* 19(12):994-996; 1977.

Liver biopsies from 13 patients with hepatitis B surface antigen (HBsAg)- and e antigen-positive chronic active hepatitis (CAH), 4 HBsAg- and e antigen-positive patients on chronic hemodialysis, and 2 patients with antigen-negative CAH (controls) were examined using the direct immunofluorescence technique, to determine the intracellular localization of the e antigen. The e antigen was demonstrated in 13 of 14 patients with HBsAg/e antigen-positive CAH and in all 4 patients on hemodialysis. The antigen was consistently found in the nuclei and never in the cytoplasm of hepatocytes. Preincubation with unlabeled antibody to hepatitis B core antigen (anti-HBcAg) before incubation with either anti-HBc-fluorescein isothiocyanate (FITC) or anti-HBc-Rhodamine showed complete blockage of HBcAg-specific fluorescence. After preincubation with unlabeled anti-HBcAg followed by incubation with anti-e-FITC or -Rhodamine, a bright fluorescence for intranuclear e antigen was revealed. There was no evidence for e antigen in the cytoplasm, although almost 20% of the hepatocytes had HBsAg in their cytoplasm after incubation with anti-HBs-FITC. These results indicate that the e antigen is localized in the nuclei of the hepatocytes. The authors conclude that the e antigen and the core antigen are not identical, although they are often present simultaneously in the nucleus of the hepatocyte.

5699 IMMUNOFLUORESCENCE DETECTION OF NEW ANTIGEN-ANTIBODY SYSTEM (δ/ANTI-δ) ASSOCIATED TO HEPATITIS B VIRUS IN LIVER AND IN SERUM OF HBsAg CARRIERS. (Eng.) Rizzetto, M.; Canese, M. G.; Arico, S.; Crivelli, O.; Trepo, C.; Bonino, F.; Verme, G. (Ospedale Mauriziano Umberto I, Cs. Turati 46, 10128 Turin, Italy). *Gut* 18(12):997-1003; 1977.

A new antigen-antibody system associated with the hepatitis B virus and immunologically distinct from the hepatitis B surface, core, and e systems is reported. The new antigen, termed δ, was detected by direct immunofluorescence only in the liver cell nuclei of patients with hepatitis B surface antigen (HBsAg) positive chronic liver disease. At present, the intrahepatic expression of hepatitis B core antigen (HBcAg) and δ antigen appears to be mutually exclusive. No ultrastructural aspect corresponding to the δ antigen could be identified. δ Antibody was found in the serum of chronic HBsAg carriers, with a higher prevalence in patients with liver damage. The nuclear fluorescence patterns of HBcAg and δ antigen were similar; it is only possible to discriminate between the two antigens by using the respective specific antisera.

5700 NEONATAL HEPATITIS B INFECTION. A LONGITUDINAL STUDY OF EIGHT CASES [Abstract]. (Eng.) Skinhoj, P. (Rigshospitalet, Copenhagen, Denmark). *Digestion* 16(4):361; 1977.

5701 INTERNATIONAL WORKSHOP ON HEPATITIS B AND LIVER CANCER: SPECIAL REPORT. (Eng.) Ziegler, J. L.; Adamson, R. H.; Barker, L. F.; Fraumeni, J. F., Jr.; Gerin, J.; Purcell, R. H. (Clinical Oncology Program, Natl. Cancer Inst., Natl. Inst. Health, Bethesda, MD 20014). *J. Natl. Cancer Inst.* 60(3):717; 1978.

5702 TEMPLATE BLOCKADE OF HEPATITIS B VIRUS, A NEW APPROACH TO THERAPY [Abstract]. (Eng.) Hirschman, S. Z. (Mt. Sinai Sch. Medicine, New York, NY 10029). *Gastroenterology* 73(5):1225; 1977.

5703 REPEATED TYPE B HEPATITIS INFECTIONS: TEN CASES STUDIED PROSPECTIVELY [Abstract]. (Eng.) Schulman, A. N.; Fagen, N. D.; Ling, C. M.; Overby, L. R.; Morton, D. L.; Gitnick, G. L. (Univ. California, Los Angeles, CA). *Gastroenterology* 72 (5, Part 2):1182; 1977.

5704 THE UTILIZATION OF PLASMA LIPOPROTEIN (Lp) ELECTROPHORESIS IN THE ASSESSMENT OF LIVER INJURY IN VIRAL HEPATITIS [Abstract]. (Eng.) Hawkins, H. L.; Davidson, O. L., III; Sabesin, S. M. (Univ. Tennessee Center Health Sciences, Memphis, TN). *Gastroenterology* 72(5, Part 2):1068; 1977.

5705 IMMUNOELECTRON MICROSCOPIC STUDY OF HEPATITIS B ANTIGENS IN LIVER TISSUE [Abstract]. (Eng.) Huang, S. N. (Dept. Pathology, McGill Univ., Montreal, Quebec, Canada). *Gastroenterology* 72(5, Part 2):1181; 1977.

5706 DEMONSTRATION IN THE SERUM AND LIVER OF HEPATITIS B SURFACE ANTIGEN (HBsAg) CARRIERS OF TWO DISTINCT COMPONENTS OF THE eAg COMPLEX AND DESCRIPTION OF A NEW IMMUNOFLUORESCENCE TEST FOR THE DETECTION OF AN e NUCLEAR ANTIGEN APPARENTLY LINKED TO DNA POLYMERASE [Abstract]. (Eng.) Trepo, C.; Hantz, O.; Trepo, D.; Chevalier, P.; Vitvitski, L.; Sepetjian, M.; Brette, R. (INSERM U 45, Hopital Edouard-Herriot, 69374 Lyon, France). *Digestion* 15(5):445-446; 1977.

See also, 5333, 5335, 5645, 5651, 5673, 5714, 5716, 5717, 5719, 5764, 5839.

LIVER AND BILIARY TRACT

Chronic Hepatitis

5707 INVESTIGATION OF COLLAGEN METABOLITES IN CHRONIC DIFFUSE DISEASES OF THE LIVER. (Rus.) Komarov, F.; Suchkov, A.; Pogromov, A. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 55(11):62-67; 1977.

In an attempt to develop new clinical-laboratory criteria for the activity of fibrinogenesis in chronic liver lesions, the content of collagen metabolites was determined in the blood and urine of 129 patients (85 with cirrhosis, 19 with liver steatosis, 15 with chronic persistent hepatitis, and 10 with chronic active hepatitis). The patients with chronic active hepatitis had elevated urinary excretion of free and protein-bound hydroxyproline (2.83 and 61.01 mg/day, resp., compared with 1.22 and 20.45 mg/day in healthy controls) and an elevated level of protein-bound plasma hydroxyproline (13.98, compared to 8.50 μg/ml in controls). The patients with cirrhosis had elevated urinary excretion of free and protein-bound hydroxyproline (3.50 and 38.95 mg/day, resp.) and an increased content of plasma protein-bound hydroxyproline (13.10 μg/ml). The difference between the patients with chronic persistent hepatitis or with liver steatosis and the healthy controls was not statistically significant.

5708 PULMONARY VENTILATION, GAS EXCHANGE AND PULMONARY CIRCULATION IN CHRONIC DIFFUSE LIVER LESIONS. (Rus.) Kireev, P. M.; Martynov, I. F.; Batal, A. O. (Dept. Internal Diseases, Patris Lumumba Univ., Moscow, USSR). *Klin. Med. (Mosk.)* (12):95-101; 1977.

The state of pulmonary ventilation, gas exchange, and pulmonary circulation was studied in a group of 87 patients with various forms of chronic hepatitis or cirrhosis. The patients were divided into five groups: group 1 consisted of 10 patients with chronic persistent hepatitis, group 2 of 13 patients with chronic active hepatitis, group 3 of 10 patients with portal cirrhosis, and group 5 of 27 patients with postnecrotic cirrhosis. All patients had decreased lung vital capacity (3,050 ml, 2,774 ml, 2,668 ml, 2,267 ml, and 2,440 ml in groups 1-5, resp., compared with 3,968 ml in healthy controls). Maximal lung ventilation was also decreased in all patients, and comprised 41.2% of the expected value in the patients with postnecrotic cirrhosis and 58.5% of the expected value in the patients with chronic active hepatitis. All patients had marked hyperventilation due to the increased minute respiratory volume (8.9, 10.1, 8.0, 10.0, and 8.7 liters in groups 1-5, resp., compared with 7.1 liters in healthy controls.).

5709 CHRONIC HEPATITIS: A PROBLEM FOR THE PATHOLOGIST. (Eng.) Scheuer, P. J. (Royal Free Hosp., Pond St., London NW3 2QG, England). *Histopathology* 1(1):5-19; 1977.

The various forms and histological diagnosis of chronic hepatitis are reviewed. The accepted histological categories of chronic hepatitis are chronic persistent hepatitis (CPH) and chronic active or aggressive hepatitis (CAH). A third form, chronic lobular hepatitis (CLH), encompasses those cases in which the lesion is predominantly within the lobules and in which portal and periportal inflammation are mild. International agreement on a reproducible and rational nomenclature of chronic hepatitis is still far from complete. CPH is characterized by portal inflammation. Histological definition is simple, but there are diagnostic pitfalls. The category may need subdivision on the basis of immunological studies. CAH should be regarded as a complex rather than a single disease, and it is important to specify the etiology and pathological components in each instance. The concept of CAH must be altered to incorporate the lesion of bridging hepatic necrosis (BHN). Piecemeal necrosis, accompanied by inflammatory infiltration, is considered to be the most important of the various pathogenetic factors in CAH, but BHN probably plays a significant part in accelerating the development of cirrhosis. An excessive portal and periportal inflammatory reaction with or without BHN, in a liver biopsy taken during the course of an acute hepatitis, helps to predict a possible chronic course.

5710 CHRONIC HEPATITIS. CURRENT VIEWS ON CLASSIFICATION, PATHOGENESIS, AND TREATMENT. (Rus.) Podymova, S. D. (I. M. Sechenov First Moscow Medical Inst., Moscow, USSR). *Klin. Med. (Mosk.)* 45(10):117-125; 1977.

Current views on the classification, pathogenesis, and treatment of chronic hepatitis are reviewed. Etiologically, chronic hepatitis can be caused by infectious factors (acute viral hepatitis), toxic and toxico-allergic factors, and alcohol. Recent discovery of the Australia antigen casts a new light on the etiology of chronic hepatitis. Morphologically, chronic hepatitis can be divided into active, persistent, and cholestatic (in 32 patients with diagnosed chronic cholestatic hepatitis, intrahepatic cholestasis was the chief clinical symptom). The results of examination of 200 patients with chronic hepatitis indicate that autoimmune disturbances are characteristic for the active stages of chronic liver lesions: the patients in relapse of chronic active hepatitis featured marked elevation of IgG and IgM levels. Antibodies against the smooth muscles were detected in 54% of the patients with active chronic hepatitis, 38% of the patients with mixed cirrhosis, 25% of the patients with primary biliary cirrhosis, and were not detected in the patients with persistent hepatitis, systemic lupus erythematosus, rheumatoid arthritis, or other collagen diseases. Mitochondrial antibodies (MA) were detected in 85% of the patients with primary biliary cirrhosis and cholestatic hepatitis and in 25% of the patients with chronic active hepatitis; all MA-positive patients with chronic active hepatitis had clinical, biochemical, and histological symptoms of cholestasis. Among the immunodepressants used for the treatment of the patients with immunologic manifestations are glucocorticosteroid hormones and some derivatives of chloroquinolines.

5711 EVALUATION OF THE EFFICACY OF STAGE-BY-STAGE TREATMENT OF PATIENTS WITH CHRONIC HEPATITIS. (Rus.) Serediuk, N. N.; Neiko, E. M.; Gerasimchuk, A. S.; Foraia, A. I. (Medical Inst., Ivano-Frankovsk, USSR). *Klin. Med. (Mosk.)* 56(2): 47-49; 1978.

The efficacy of various treatment regimens was studied in 54 patients with various forms of chronic hepatitis. Twenty-three patients underwent ambulatory treatment alone, 19 patients underwent hospital and then ambulatory treatment, and 14 patients underwent hospital, ambulatory, health resort, and then ambulatory treatment again. The duration of remission in the patients with chronic active hepatitis who underwent ambulatory and hospital-ambulatory treatment was 7.5 months and 10.5 months, resp., compared with 13.5 months in the patients who underwent prolonged, stage-by-stage treatment; efficacy of the stage-by-stage treatment was even greater in the patients with chronic persistent hepatitis (duration of remission in these patients was 2.2 times greater than in the patients who underwent ambulatory treatment alone).

5712 OUTCOME OF CHRONIC ACTIVE HEPATITIS: INFLUENCE OF HISTOCOMPATIBILITY ANTIGENS AND TRIGGERING FACTORS. (Eng.) Lindberg, J.; Lindholm, A.; Iwarson, S. (East Hosp., S-416 85 Goteborg, Sweden). *J. Infect. Dis.* 137(2):189-193; 1978.

The clinical course and outcome of chronic active hepatitis were studied in 25 patients with chronic active hepatitis triggered by external factors (viruses or drugs) and 20 patients with cryptogenic chronic active hepatitis, all of whom were followed for 2 to 5 yr. The first group showed a higher frequency of clinical and biochemical resolution at the end of the observation period than did the second group. The group with cryptogenic disease had a significantly increased frequency of the histocompatibility locus antigen HLA-B8 (75%) in comparison with that in patients with viral or drug-induced hepatitis (40%, $p<0.05$) and had a very large number of women (90%). The group with virus- or drug-induced hepatitis did not differ from normal controls in regard to the distribution of HLA antigens. HLA-B8 and HLA-B12 were found in all but two patients in the group with cryptogenic hepatitis: this group of patients had elevated levels of γ-globulin ($\geq$2.5 mg/100 ml) and autoantibodies in their sera more frequently (80% and 72.7%) than did the group with virus or drug-induced diseases (40% and 10.5% had elevated γ-globulin and autoantibodies, resp.; $p<0.05$ and $p<0.01$, resp.). The results suggest that there are at least two types of chronic active hepatitis: one genetically determined, with signs of enhanced immunoreactivity and with a low degree of healing in 5 yr, and another type triggered by external factors and without predisposing genetic factors. The data suggest that the clinical outcome is more favorable for patients with the second type of chronic active hepatitis.

5713 THE SPECTRUM OF FREE AMINO ACIDS IN SERUM AND AMINO ACID COMPOSITION OF SERUM PROTEINS IN PATIENTS WITH CHRONIC HEPATITIS AND CIRRHOSIS. (Rus.) Manto, I. E.; Manto, E. I. (Dept. Pathologic Physiology, State Univ., Uzhgorod, USSR). *Vrach. Delo* (9):93-95; 1977.

To evaluate the diagnostic significance of disturbances of amino acid metabolism in chronic liver lesions, the spectra of serum free amino acids and serum protein amino acids were studied in 73 patients with chronic hepatitis and 52 patients with cirrhosis. The amino acid spectra were assayed by paper chromatography. The quantitative changes in free amino acid content were more pronounced in the patients with cirrhosis. Compared with the healthy controls, the patients with cirrhosis had decreased content of total serum protein and decreased content of lysine, arginine, aspartic acid, and glutamic acid. The patients with chronic hepatitis had increased content of lysine, histidine, serine, glycine, glutamic acid, threonine, alanine, phenylalanine, and leucine.

5714 LYMPHOCYTE CYTOTOXICITY AGAINST CHANG LIVER CELLS IN CHRONIC ACTIVE HEPATITIS. (Eng.) Kakumu, S.; Hara, T.; Goji, H.; Sakamoto, N. (Nagoya Univ. Sch. Medicine, Nagoya, Japan). *Cell. Immunol.* 36(1):46-53; 1978.

The cytotoxic effect of peripheral blood lymphocytes from 18 patients with chronic active hepatitis (CAH) on Chang liver cells was studied using a ^{51}Cr release assay. Cytotoxic effector cell activity was unaffected or slightly enhanced after the removal of glass-adherent mononuclear cells, indicating that the major effector cell is not a classical monocyte. Lymphocytes from 12 of the 18 patients with CAH were cytotoxic, and the cytotoxic cells were contained within thymus-derived cell (T-cell)-depleted fractions. Further studies revealed that these effector cells were killer (K) cells, not bone marrow-derived (B) cells. K cells were identified as constant fragment (Fc)- and complement receptor-bearing cells without detectable surface immunoglobulin. Serial studies in CAH showed continuous cytotoxicity in contrast to transient cytotoxicity in acute viral hepatitis, suggesting that the cytotoxic activity of lymphocytes is responsible for persistence of the disease.

5715 T AND B LYMPHOCYTES IN PATIENTS WITH CHRONIC ACTIVE HEPATITIS (CAH). (Eng.) Colombo, M.; Vernace, S. J.; Paronetto, F. (Istituto di Clinica Medica Generale e Terapia Medica III, Univ. Milan, Milan, Italy). *Clin. Exp. Immunol.* 30(1):4-9; 1977.

To investigate the immune pathogenesis of chronic active hepatitis, absolute number of thymus-derived (T) and bone marrow-derived (B) lymphocytes as well as active E rosette-forming cells were measured in 27 patients with CAH, and in 30 controls. In patients with CAH without cirrhosis, active E rosette-forming cells (a subpopulation of T lymphocytes considered to be actively involved in cell-mediated immune reactions) as well as lymphocytes with surface markers for IgA, IgM, and IgG were increased. In patients with CAH and cirrhosis, total T lymphocytes were decreased. These results emphasize the significance of lymphocytes in CAH, and suggest the importance of monitoring T- and B-cell populations in patients with this disease.

5716 ALTERATION IN SUPPRESSOR CELL ACTIVITY IN CHRONIC ACTIVE HEPATITIS. (Eng.)

Hodgson, H. J. F.; Wands, J. R.; Isselbacher, K. J. (Royal Postgraduate Medical Sch., London W12, England). *Proc. Natl. Acad. Sci. U.S.A.* 75(3):1549-1553; 1978.

Peripheral blood mononuclear cells obtained from 24 patients with acute or chronic active hepatitis were studied to determine if there is an abnormality in concanavalin A-induced suppressor cell activity compared with control subjects. Suppressor cells were generated by preincubation of the mononuclear cells with a mitogenic concentration of concanavalin A (6 μg/ml) for 48 hr followed by treatment with mitomycin C (50 μg/ml) and α-methylmannoside (30 mM). Suppressor cell activity was assessed in second cultures by inhibition of concanavalin A-stimulated blast transformation of fresh allogeneic lymphocytes. Concanavalin A-stimulated suppressor activity was not elicited in mononuclear cells from the majority of patients with chronic active hepatitis in contrast to patients with acute hepatitis or acute inflammatory diseases and controls ($p<0.001$). This finding was demonstrable in chronic active hepatitis patients in remission and relapse, both on and off prednisone therapy, and varied considerably during the course of the disease. The extent of liver injury was not related to the measured suppressor cell activity. These studies suggest that in chronic active hepatitis, a disease in which the host immune response may be involved, there is a defect in concanavalin A-stimulated suppressor cells.

5717 PERSISTENT HBs-ANTIGENEMIA AND CHRONIC HEPATITIS. (Rus.) Bliuger, A. F.; Krupnikova, E. Z.; Veksler, Kh. M.; Kartashova, O. Ia.; Smirnova, N. V.; Nizgol'd, E. V. (No affiliation given). *Vestn. Akad. Med. Nauk SSSR* (9):45-53; 1977.

The results of comparative immunologic analyses of various forms of persistent antigenemia involving hepatitis B surface antigen (HBsAg) in 17 patients with chronic persistent hepatitis (CPH), 13 with chronic active hepatitis (CAH), and 8 "healthy" HBsAg-carriers are presented. HBsAg was detected in 10/17 patients with CPH and 6/13 patients with CAH. One-third of the patients with HBsAg-positive CPH showed inhibition of T-lymphocytes and sensitization of immunocytes to HBsAg. All patients with HBsAg-positive CAH showed inhibition of functional activity of T lymphocytes, two-thirds of the patients had decreased number of T lymphocytes, and one-half had decreased number of B lymphocytes. There were no regular immunologic changes in the "healthy" HBsAg carriers.

5718 AUSTRALIA ANTIGEN IN PERSISTENT HEPATITIS IN NORTHERN INDIA. (Eng.) Sakhrie, H. V.; Shrivastava, P. N.; Chuttani, H. K.; Saha, K. (Maulana Azad Medical Coll., New Delhi, India). *J. Indian Med. Assoc.* 69(8):170-173; 1977.

5719 HLA ANTIGENS IN HB_S ANTIGEN POSITIVE CHRONIC ACTIVE HEPATITIS. (Eng.) Penner, E.; Grabner, G.; Dittrich, H.; Mayr, W. R. (Ordinariat fur Gastroenterologie, Univ. Vienna, Vienna, Austria). *Tissue Antigens* 10(1):63-64; 1977.

See also, 5333, 5335, 5337, 5645, 5647, 5686, 5693, 5696, 5697, 5698, 5699, 5706.

LIVER AND BILIARY TRACT

Alcoholic Liver Disease

5720 SERUM α_1-ANTITRYPSIN LEVELS IN ALCOHOLIC HEPATITIS. (Eng.) Mihas, A. A. (Div. Gastroenterology, Univ. Alabama in Birmingham, University Station, Birmingham, AL 35294). *Digestion* 17(3):275-277; 1978.

Serum α_1-antitrypsin concentrations were measured in 68 patients with liver disease, 10 of whom had pancreatitis associated with alcoholic hepatitis. High mean values (359 ± 18.0 ng/dl, $p<0.01$ in comparison with controls) were found in the 30 patients with alcoholic hepatitis without pancreatitis, whereas the 10 patients with acute viral hepatitis and the 18 with chronic active hepatitis did not show any significant differences from the 20 controls (292 ± 13.7 ng/dl). In the patients with both alcoholic hepatitis and acute pancreatitis, the mean value (218 ± 5.8 ng/dl) was significantly lower ($p<0.001$) than in the controls. The mechanism for the reduction of serum α_1-antitrypsin levels in this group remains to be clarified, but low serum α_1-antitrypsin may be due to increased proteolytic enzyme concentrations in acute pancreatitis.

5721 LIVER SCINTIGRAPHY IN ALCOHOLIC LIVER DISEASE. (Eng.) Prakash, V.; Lin, M. S.; Kriss, J. P. (Veterans Admin. Hosp., Palo Alto, CA 94304). *Clin. Nucl. Med.* 2(9):308-309; 1977.

5722 UNUSUAL PRESENTATION OF LAENNEC'S CIRRHOSIS WITH HAEMOPTYSIS. (Eng.) Banerji, D. (Burnpur Hosp., Asansol, India). *J. Indian Med. Assoc.* 68(1):14-15; 1977.

See also, 5333, 5335, 5657.

LIVER AND BILIARY TRACT

Cirrhosis

5723 PRIMARY BILIARY CIRRHOSIS. (Eng.) Sherlock, S. (No affiliation given). *Mt. Sinai J. Med.* 44(6):790-797; 1977.

Immunological changes, early diagnosis, and therapy of primary biliary cirrhosis (PBC) are reviewed. PBC is a disease where granulomas may be found in the liver and elsewhere. It can be distinguished from sarcoidosis by its clinical and biochemical picture and the negative Kveim-Siltzbach test. Cell-mediated immunologic reactions are depressed. The serum mitochondrial antibody test is positive in about 90% of patients and is of diagnostic value. PBC may be diagnosed at a presymptomatic stage by (1) recognition of commonly associated disease, (2) abnormal biochemical tests, particularly increased serum alkaline phosphatase and IgM levels, (3) presence of serum mitochondrial antibodies, and (4) diagnostic or compatible hepatic histology. The prognosis of the presymptomatic state is impossible, but 2 to 10 yr may pass before symptoms develop. The duration of the symptoms is 4 to 7 yr. A controlled prospective trial of azathioprine showed only doubtful benefit for the drug. Liver copper levels are very high in primary biliary cirrhosis and D-penicillamine (900 mg/day) reduces liver copper concentration and serum aspartate transaminase levels. Because of the variable natural history of the disease and the observed longer survival following early diagnosis, many years must elapse before it is known whether cirrhosis, portal hypertension, and liver failure are delayed or prevented by the treatment. Treatment with D-penicillamine, preferably within controlled trials, is recommended despite the associated toxicity.

5724 MECHANISM FOR REDUCED DRUG CLEARANCE IN PATIENTS WITH CIRRHOSIS. (Eng.) Pessayre, D.; Lebrec, D.; Descatoire, V.; Peignoux, M.; Benhamou, J. P. (Hopital Beaujon, 92118 Clichy Cedex, France). *Gastroenterology* 74(3):566-571; 1978.

The mechanism responsible for reduced clearance of highly extractable *d*-propranolol (i.e., in normal subjects) in patients with cirrhosis was investigated in 14 patients with alcoholic cirrhosis, 6 alcoholics with fibrosis but no cirrhosis, and 6 normal controls. After the i.v. injection of *d*-propranolol (0.4 mg/kg), the total clearance of the drug was not different in the subjects with normal liver (21 ± 7 ml/min/kg) from that in the patients with alcoholic fibrosis (18 ± 8 ml/min/kg); the total clearance of the drug was significantly lower in the patients with alcoholic cirrhosis (8 ± 5 ml/min/kg, $p<0.05$). Concomitantly with the pharmacokinetic study, a hepatic vein was catheterized, and indocyanine green was infused in all patients with fibrosis of the liver and in 6 of the 14 patients with cirrhosis. Information provided by these techniques allowed measurement of the hepatic clearance of *d*-propranolol and estimation of its contributing factors: the hepatic clearance of *d*-propranolol was 18 ± 6 ml/min/kg in patients with fibrosis and only 6 ± 3 ml/min/kg in patients with cirrhosis ($p<0.05$); the liver blood flow was 25 ± 9 ml/min/kg in the former and 14 ± 6 ml/min/kg in the latter patients ($p<0.05$); the hepatic extraction ratio of *d*-propranolol was 0.73 ± 0.09 in patients with fibrosis of the liver and 0.41 ± 0.17 in patients with cirrhosis ($p<0.05$); and the intrinsic hepatic clearance of *d*-propranolol, a mathematical concept expressing the maximal ability of the liver to remove the drug from the blood, was 72 ± 30 ml/min/kg in the former and only 12 ± 7 ml/min/kg in the latter patients ($p<0.05$). It is concluded that in patients with cirrhosis (1) the total clearance of *d*-propranolol is reduced, (2) the reduced total clearance is a consequence of a reduced hepatic clearance, and (3) the reduced hepatic clearance results mainly from an impaired ability of the liver to remove the drug from the blood and secondarily from a reduced liver blood flow.

5725 REDUCTION IN PERIPHERAL BLOOD K CELLS AND ACTIVATED T CELLS IN PRIMARY BILIARY CIRRHOSIS. (Eng.) Sandilands, G. P.; MacSween, R. N. M.; Gray, K. G.; Holden, R. J.; Mills, P.; Reid, F. M.; *et al.* (Western Infirmary, Glasgow G11 6NT, Scotland). *Gut* 18(12):L1017-L1020; 1977.

Lymphocyte subpopulations were measured in the peripheral blood of 13 patients with primary biliary cirrhosis (PBC), 13 with chronic active hepatitis (CAH), and 16 age- and sex-matched normal subjects, since sequestration of a particular subpopulation in the liver might be reflected by a diminution of this population in the circulation. A significant (relative and absolute) reduction in activated thymus-derived (T) and killer (k) cells, compared with that in normal subjects, was found in PBC ($p=0.01$ for T cells, $p=0.002$ for K cells) but not in CAH. The reduction in K cells observed in PBC was accompanied by a parallel decrease in lymphocyte-mediated antibody-dependent cytotoxicity. The results support the hypothesis that T and K cells may be sequestered in the liver. A further possibility is that the decrease in K cells may be partly caused by the binding of immune complexes to the Fc (antibody constant fragment) receptors of these cells.

5726 HEMATOLOGICAL CHANGES FOLLOWING SPLENECTOMY IN LIVER CIRRHOSIS. (Rus.) Galeev, M. A.; Farkhutdinov, R. G.; Gaisina, V. T.; Ibragimov, R. M.; Safin, I. A. (Dept. General Surgery, Bashkir Medical Inst., Ufa, USSR). *Klin. Med. (Mosk.)* 55(11):85-89; 1977.

The functional activity of the megakaryocytic-platelet system was studied in 127 patients with cirrhosis, including 60 patients with postnecrotic cirrhosis, 39 with portal cirrhosis, 16 with mixed cirrhosis, and 12 with biliary cirrhosis. Seventy-nine patients had enlargement of the spleen. The patients with hypersplenism had a significantly decreased number of active megakaryocytes (15.4 ± 0.7 compared to 30.3 ± 1.8% in the patients without hypersplenism, $p<0.01$), thrombocytopenia (to 93.3 ± 9.9 cells/mm^3 compared to 207.3 ± 21.2 cells/ml in the patients without hypersplenism, $p<0.001$), and more pronounced inhibition of adhesive activity of the platelets (14.3 ± 3.9% compared to 27.0 ± 4.2% in the patients without hypersplenism, $p<0.001$). Sixty-eight patients underwent conservative treatment and 59 underwent surgery. Surgically treated patients could be divided into two groups: group 1 consisted of 34 patients who underwent splenectomy with organoanastomoses, and group 2 included 25 patients who underwent splenectomy with organoanastomoses, marginal resection of the liver, and cannulation of the portal vein with subsequent prolonged infusion of therapeutic agents. The best results were achieved in group 2: the number of active megakaryocytes increased to 44.0 ± 2.7% ($p<0.001$), adhesive activity of the platelets increased to 39.7 ± 4.1% ($p<0.001$), and the total number of platelets increased to 271.7 ± 15.5 cells/mm^3 ($p<0.001$).

5727 SOURCES OF SERUM [^{14}C]-OCTANOATE IN CIRRHOSIS OF THE LIVER AND HEPATIC ENCEPHALOPATHY. (Eng.) Rabinowitz, J. L.; Staeffen, J.; Blanquet, P.; Vincent, J. D.; Terme, R.; Series, C.; *et al.* (Veterans Admin. Hosp., Philadelphia, PA 19104). *J. Lab. Clin. Med.* 91(2):223-227; 1978.

Studies were carried out in 25 patients with alcoholic cirrhosis and hepatic encephalopathy to determine the origin of high levels of serum octanoate. Assays for octanoate were modified to permit isolation of pure octanoate after gas-liquid chromatography. The patients with these conditions received differently labeled ^{14}C-palmitates i.v.; serum ^{14}C-octanoate was isolated in each case and shown by mass spectrometry to be authentic octanoate. 1-^{14}C-oleate and 1-^{14}C-stearate were also shown to serve as precursors of serum ^{14}C-octanoate. When differently labeled palmitates (1-^{14}C, omega-^{14}C, and ^{14}C-uniformly labeled) were used, different yields of serum ^{14}C-octanoate were recovered. Octanoate samples were chemically degraded to yield individual carbons or groups of carbons. In this manner, it was possible to determine the percentage distribution of the ^{14}C-label within the octanoate carbon chain. It was found that 60% to 80% of the serum octanoate was obtained from the incomplete beta-oxidation of long-chain fatty acids, and that 20% to 40% of the octanoate may have been formed *de novo*.

5728 HEPATOFUGAL PORTAL BLOOD FLOW IN HEPATIC CIRRHOSIS. (Eng.) Foster, D. N.; Herlinger, H.; Miloszewski, K. J. A.; Losowsky, M. S. (St. James' Univ. Hosp., Leeds, England). *Ann. Surg.* 187(2):179-182; 1978.

Three patients with histologically confirmed cirrhosis in whom hepatofugal portal blood flow was unequivocally demonstrated by arteriography are reported. In these patients, no surgical portasystemic shunt had been performed, and there was no evidence of the Budd-Chiari syndrome or hepatoma, conditions associated with reversed portal blood flow. Theoretical considerations suggest that shunt surgery for bleeding esophageal varices should not be ruled out on the grounds of hepatofugal portal flow. However, end-to-side portacaval anastomosis and distal splenorenal shunt might predispose to the early redevelopment of esophageal varices when reversed portal flow is present. Side-to-side portacaval and conventional splenorenal shunts might be preferable in having less effect on hepatic parenchymal perfusion than when orthograde portal flow is the case.

5729 PLASMOSORPTION AND PLASMAPHERESIS WITH PLASMA EXCHANGE BY A CONTINUOUS SEPARATION APPARATUS IN THE TREATMENT OF HEPATIC INSUFFICIENCY. (Rus.) Lopukhin, Iu. M.; Molodenkov, M. N.; Shurkalin, B. K.; Evseev, N. G. (N. I. Pirogov Second Medical Inst., Moscow, USSR). *Anesth. Reanim.* (2):57-61; 1977.

The results of the first clinical trial of artificial hemabsorption for the treatment of hepatic insufficiency are presented. To avoid the destruction of formed blood elements, which might lead to severe complications in the patient and to "thrombosis" of the column, blood plasma was separated by a continuous separation apparatus, the "Celltrifuge" (Aminco). Plasmapheresis with plasma exchange was performed in five patients with acute hepatic insufficiency (4 patients had obstructive jaundice and cholangitis, and 1 patient had CCl_4 intoxication); plasmapheresis with plasmasorption was performed in four patients with acute hepatic insufficiency due to intoxication with CCl_4, dicholoroethane, and trichloroethylene. The procedure reduced the symptoms of intoxication (disappearance of encephalopathy manifestations and skin itch), decreased the blood bilirubin level (by 2-3 mg%), and induced a slight thrombocytopenia.

5730 ISOBUTYL 2-CYANOACRYLATE (BUCRYLATE) IN OBLITERATION OF GASTRIC CORONARY VEIN AND ESOPHAGEAL VARICES.

(Eng.) Lunderquist, A.; Borjesson, B.; Owman, T.; Bengmark, S. (Univ. Hosp., S-221 85 Lund, Sweden). *Am. J. Roentgenol.* 130(1): 1-6; 1977.

Clinical experience with injecting isobutyl 2-cyanoacrylate (bucrylate) into the short gastric and coronary veins for the treatment of portal hypertension and bleeding esophageal varices in 22 patients is reviewed. Percutaneous transhepatic portography was performed in all patients. One or more veins feeding esophageal varices were occluded with bucrylate. Follow-up examination in eight patients 1-12 months later showed recanalization of previously obliterated veins in six; however, these veins were markedly smaller than before the procedure. In patients where veins were still occluded, new veins had opened up and carried blood to the esophageal varices, which were filled to a lesser degree than before. In the authors' experience, bucrylate is superior to Gelfoam, thrombin, and Etolein in producing venous occlusion.

5731 RANDOMIZED TRIAL OF EMERGENCY MESOCAVAL AND PORTACAVAL SHUNTS FOR BLEEDING ESOPHAGEAL VARICES.

(Eng.) Malt, R. A.; Abbott, W. M.; Warshaw, A. L.; Vander Salm, T. J.; Smead, W. L. (Massachusetts General Hosp., Boston, MA 02114). *Am. J. Surg.* 135(4):584-588; 1978.

To compare the efficacy of mesocaval and portacaval shunts for bleeding esophageal varices, a randomized trial of emergency portacaval or mesocaval shunting was conducted in 24 cirrhotic patients bleeding from esophageal varices. The 11 patients who had mesocaval shunts were comparable to the group who had portacaval shunts in age distribution, sex, and preoperative physical condition. Postoperative fatality rates were 46% after portacaval shunting and 73% after mesocaval shunting. These results favor portacaval shunts for the emergency control of bleeding varices in the spectrum of patients seen in an urban hospital.

5732 PORTAL HYPERTENSION IN FIBROCHOLANGIOCYSTOSIS.

(Rus.) Cistova, L. V.; Leontiev, A. F.; Markov, B. A.; Osipov, N.; Potapova, I. N.; Dynkova, I. I. (Res. Inst. Pediatrics, Moscow, USSR). *Khirurgiia* (1):52-57; 1978.

A group of 29 children (1 to 14 yr) with congenital fibrocholangiocystosis (FCC) is reviewed. The early clinical manifestations of the syndrome of portal hypertension were hepatosplenomegaly (28), esophageal-gastric hemorrhage (13), and protrusion of the umbilical vein (4); 14 children had combined polycystosis of the liver and kidneys. Splenoportography showed stenosis of the portal vein. Unlike the patients with cirrhosis, children with FCC had a markedly developed by-pass circulation. To prevent esophageal-gastric hemorrhage, 19 children underwent surgery (5 of them underwent repeated surgery). Surgery included splenectomy (13), splenorenal anastomosis (5), cavo-mesenterial anastomosis (2), gastrotomy (2), and external devascularization of the stomach (2). Two children died immediately after surgery (of renal and hepatic insufficiency), three children died within 14 yr of surgery (2 of esophageal-gastric hemorrhage and 1 of hepatic insufficiency).

5733 PORTAL HYPERTENSION IN SYSTEMIC MASTOCYTOSIS.

(Eng.) Capron, J. P.; Lebrec, D.; Degott, C.; Chivrac, D.; Coevoet, B.; Delobel, J. (Centre Hospitalier Universitaire, Place Victor Pauchet, 80030 Amiens Cedex, France). *Gastroenterology* 74(3):595-597; 1978.

The case of a 66-yr-old man with portal hypertension related to systemic mastocytosis is reported. The liver was enlarged, and light microscopy showed portal mast cell infiltration and fibrosis. Portal hypertension was evidenced by splenomegaly, esophageal varices, and an increased wedged-free hepatic venous pressure gradient. Arteriography showed that the portal vein was patent. Portal hypertension could be the consequence of intrahepatic block due to mast cell infiltration and/or fibrosis of the liver.

5734 TRANSVASCULAR ESCAPE RATE OF ALBUMIN IN LIVER CIRRHOSIS, AND ITS POSSIBLE ROLE IN FORMATION OF ASCITES.

(Eng.) Henriksen, J. H.; Winkler, K. (Hvidovre Hosp., Kettegaard Alle 30, DK-2650 Hvidovre, Denmark). *Scand. J. Gastroenterol.* 12(7):877-884; 1977.

The transvascular escape rate of albumin (TER_a) was measured with ^{131}I-labeled human serum albumin (^{131}I-RISA) during hepatic vein catheterization in 10 men with alcoholic liver cirrhosis. Portal hypertension (mean wedged hepatic vein pressure 26 ± 6.6 mm Hg), and low serum albumin concentration (mean 425 ± 90 μM) were present. Diuretic treatment was given to nine subjects. TER_a (mean 11.4 ± 3.1%/hr) was substantially increased ($p<0.001$)

compared to that reported in normals. A positive correlation between the postsinusoidal resistance and TER$_a$ ($r=0.91$, $p<0.02$) indicated an elevated splanchnic albumin escape rather than increased systemic transvascular escape. No significant correlation was demonstrated between TER$_a$ and wedged hepatic vein pressure. A negative correlation was demonstrated between TER$_a$ and the intravascular mass of albumin ($r=-0.69$, $p<0.05$). The total lymph flow, assuming steady state, was estimated as total albumin plasma clearance (plasma volume x TER$_a$) and was found to be high (mean 10.2 ± 2.9 1/24 hr). Subjects with tense ascites had a lower TER$_a$ ($p<0.02$) and total albumin plasma clearance than subjects without ascites. This finding may indicate that total lymph flow is smaller in patients with tense ascites, perhaps because of impeded lymphatic return.

5735 PRIMARY BILIARY CIRRHOSIS AND COELIAC DISEASE: AN ASSOCIATION?

(Eng.) Logan, R. F. A.; Ferguson, A.; Finlayson, N. D. C.; Weir, D. G. (Western General Hosp., Edinburgh, Scotland). *Lancet* 1(8058):230-233; 1978.

Four patients in whom primary biliary cirrhosis was associated with celiac disease are described. In each case, the two conditions were diagnosed simultaneously, and although symptoms were due to celiac disease, initial investigation drew attention to the liver condition. All the patients responded to a gluten-free diet and remain well 2 yr later. Primary biliary cirrhosis remains asymptomatic in three patients, but pruritus has developed in the fourth. The significance of this association is unclear and may merit formal study. Celiac disease should be considered as a possible cause of unexplained weight loss in primary biliary cirrhosis.

5736 PARENTERAL 1,25-DIHYDROXYCHOLECALCIFEROL IN HEPATIC OSTEOMALACIA.

(Eng.) Long, R. G.; Varghese, Z.; Meinhard, E. A.; Skinner, R. K.; Wills, M. R.; Sherlock, S. (Hammersmith Hosp., London W12 OHS, England). *Br. Med. J.* 1(6105):75-77; 1978.

The effect of regular i.m. injections of 1,25-dihydroxycholecalciferol (1,25-[OH]$_2$D$_3$) in four patients with biliary cirrhosis complicated by osteomalacia was tested. Despite regular, long-term, parenteral vitamin D$_2$ treatment, these patients had multiple symptoms of bone disease, and bone biopsy specimens showed osteomalacia without osteoporosis. Three patients also had a proximal myopathy. Plasma calcium values (after correction for albumin), phosphorus, magnesium, and serum 25-hydroxy-vitamin D were within normal limits. 1,25-(OH)$_2$D$_3$ treatment (15 µg every 4 weeks) relieved symptoms in three of the four patients and improved those in the fourth. Histological examination of bone showed improvement in all four patients, but serum and urinary biochemical changes were not pronounced. It is concluded that 1,25-(OH)$_2$D$_3$ treatment has a beneficial effect on bone and muscle in hepatic osteomalacia, either because vitamin D 1-hydroxylation fails in biliary cirrhosis or because hepatic osteomalacia is resistant to vitamin D$_2$ metabolites.

5737 ZINC DEFICIENCY: A CAUSE OF ABNORMAL DARK ADAPTATION IN CIRRHOTICS.

(Eng.) Morrison, S. A.; Russell, R. M.; Carney, E. A.; Oaks, E. V. (Univ. Maryland Sch. Medicine, Baltimore, MD). *Am. J. Clin. Nutr.* 31(2):276-281; 1978.

The role of zinc deficiency in the pathogenesis of abnormal dark adaptation was studied in six male cirrhotics with low serum zinc levels (<70 µg/100 ml) and abnormal dark adaptation responses (mean dark adapted final threshold 3.2 ± 0.6 versus 2.1 ± 0.2 log lux in 21 age-matched controls, $p<0.01$). Serum vitamin A concentration ranged from 15 to 37 µg/100 ml. Three patients received zinc sulfate (220 mg/day) for 1 to 2 weeks, and dark adapted final thresholds fell 0.9, 0.4, and 1.2 log lux in each patient, resp., without concurrent rises in serum vitamin A levels. Two other patients were treated initially with p.o. vitamin A (10,000 IU/day) for 2 to 4 weeks, but their final thresholds fell to normal (2.1, 2.2 log lux, resp.) only after the addition of zinc for 1 to 2 weeks. The sixth patient, treated with vitamin A and zinc together, attained a normal final threshold in 2 weeks. The improvement in dark adaptation by zinc may be due to enhanced activity of previously depressed retinol dehydrogenase.

5738 GLUCAGON METABOLISM IN CIRRHOSIS OF THE LIVER [Abstract].

(Eng.) Dudley, F. J.; Alford, F. P.; Chisholm, D. J. (Dept. Medicine, Monash Univ., Melbourne, Australia). *Gastroenterology* 72(5, Part 2):1052; 1977.

5739 INTRACTABLE ASCITES: TREATMENT WITH LEVEEN PERITONEO-VENOUS SHUNT [Abstract].

(Eng.) Bethel, R. A.; Ansley, J. D.; Bowen, P. A., II (Dept. Medicine, Emory Univ., Atlanta, GA). *Clin. Res.* 25(3):307A; 1977.

5740 DIURESIS OF ASCITES: FRAUGHT WITH OR FREE FROM HAZARD.

(Eng.) Conn, H. O. (Veterans Admin. Hosp., West Haven, CT). *Gastroenterology* 73(3):619-621; 1977.

5741 HEMODYNAMICS OF HEPATIC DISEASE FOLLOWING MUSTARD'S PROCEDURE.

(Eng./Fre.) Chaumont, P.; Kalifa, G.; Harry, G. (Hopital Parrot, 78 r. du General Leclerc, F94270 Le Kremlin-Bicetre, France). *Ann. Radiol.* 20(1):63-69; 1977.

5742 FAMILIAL HEMOCHROMATOSIS: PHYSIOLOGIC STUDIES IN THE PRE-CIRRHOTIC STAGE OF THE DISEASE [Abstract]. (Eng.) Feller, E. R.; Pont, A.; Wands, J. R.; Carter, E. A.; Foster, G.; Isselbacher, K. J. (Massachusetts General Hospital, Boston, MA). *Gastroenterology* 72(5, Part 2):1158; 1977.

See also, 5335, 5337, 5647, 5648, 5651, 5669, 5699, 5707, 5708, 5713, 5775.

LIVER AND BILIARY TRACT

Gallbladder and Biliary Tract Diseases

5743 RADIOMANOMETRIC GUIDES TO COMMON BILE DUCT EXPLORATION. (Eng.) McCarthy, J. D. (Lovelace-Bataan Medical Center, Albuquerque, NM 87108). *Am. J. Surg.* 134(6):697-701; 1977.

The usefulness of radiomanometry in increasing the accuracy of operative cholangiograms was evaluated based on results with 198 patients seen during 1967-1976, who could be grouped as having previous or existing jaundice, displaying an elevated passage pressure as a solitary abnormality, or having an isolated elevation of serum alkaline phosphatase level. Even under what would appear to be optimal conditions for roentgenographic diagnosis of cholelithiasis, many small choledocholiths were missed (17/198). Radiomanometry was performed on 29/44 patients with jaundice; there were 23 correct positive assessments of calculi, 2 false positives, and 4 false negatives. Of these 29 patients, 14 had elevated passage pressure in addition to correctly positive x-ray studies, and 3 had elevated passage pressure with false negative x-ray studies. The utility of radiomanometry was best illustrated in a group of 14 patients in whom elevated passage pressure was the only abnormality: 9 of these patients were found to have choledocholithiasis, all yielding small stones, and 3 others displayed good evidence for stenosing papillitis. This group of 14 patients would not have been identified by routine cholangiography. An isolated elevation of serum alkaline phosphatase level was found in 11 patients, 9 of whom proved to have choledocholithiasis. Passage pressures were normal in two patients with calculi and in the two patients without calculi. Cholangiographic x-ray diagnosis led to frequent errors (16% false-positives). Manometry alone is not recommended because it cannot establish that flow has traversed the sphincter of Oddi. However, if the cholangiogram was positive for calculi and the passage pressure elevated, stones were almost invariably found (95% success rate). Additionally, radiomanometry is the only method for diagnosing stenosing papillitis.

5744 LONG TERM RESULTS OF ROUX-EN-Y HEPATICO-JEJUNOSTOMY. (Eng.) Bismuth, H.; Franco, D.; Corlette, M. B.; Hepp, J. (Hopital Paul Brousse, Villejuif, France). *Surg. Gynecol. Obstet.* 146(2): 161-167; 1978.

The long-term results of Roux-en-Y hepaticojejunostomy were evaluated in 123 patients with benign bile duct diseases to ascertain if hepaticojejunostomy is a safe and durable procedure. There were no operative deaths. A peptic ulcer developed postoperatively in two patients. Only one instance of anastomotic stenosis was observed at follow-up study, averaging 5.5 yr. Six of the 11 patients with postoperative biliary symptoms had intrahepatic lithiasis, a possible indication that the symptoms were due to temporary obstruction of the anastomosis by residual stones. A refined operative technique has improved the results which over-all are highly satisfactory. The authors conclude that this is the best type of biliary anastomosis in hepatic transplantation.

5745 INCIDENTAL CHOLECYSTECTOMY DURING MAJOR ABDOMINAL SURGERY IN THE ELDERLY. (Eng.) Schreiber, H.; Macon, W. L.; Pories, W. J. (Cleveland Metropolitan General Hosp., 3395 Scranton Rd., Cleveland, OH 44109). *Am. J. Surg.* 135(2):196-198; 1978.

To investigate incidental cholecystectomy in the elderly, the morbidity and mortality of cholecystectomy, performed during unrelated major abdominal operations, were investigated in 44 patients (average age 78 yr) who were found to have cholelithiasis during surgery. Thirty-nine of them underwent incidental cholecystectomy, one had cholecystostomy, and four had no surgical treatment of their gallbladder disease. Of the 39 patients with an incidental cholecystectomy, none died and only 16 had nonfatal complications. Of these complications, only one was clearly related to the cholecystectomy and resolved spontaneously. The results compare favorably with other reports of similar procedures in elderly patients. Incidental cholecystectomy does not seem to significantly alter the mortality and morbidity of elderly patients undergoing major abdominal surgery. Incidental cholecystectomy is advocated for cholelithiasis in elderly patients as long as the gallbladder is easily accessible and the condition of the patient warrants the additional procedure.

5746 PERCUTANEOUS TRANSHEPATIC DRAINAGE OF THE BILIARY TRACT: TECHNIQUE AND RESULTS IN 104 CASES. (Eng.) Nakayama, T.; Ikeda, A.; Okuda,

K. (Kurume Univ. Sch. Medicine, Kurume, Japan). *Gastroenterology* 74(3):554-559; 1978.

A new two-step procedure for percutaneous transhepatic drainage (PTD) of the biliary tract is described. This technique was applied on a total of 105 cases of obstructive jaundice (84 with malignant and 21 with benign lesions) and was successful in 104. Catheterization is a two-step procedure consisting of the following: (a) puncture of a dilated intrahepatic duct with a steel needle, (b) insertion of a guide wire, (c) removal of the needle, (d) pushing of the catheter over the guide wire, and (e) withdrawal of the guide wire and immobilization of the catheter. This indirect approach using a steel needle first offers the advantage of more easily finding and entering the bile ducts. The decompression effect was adequate and the reduction in serum bilirubin level was quick. Operative mortality, which used to be high in jaundiced patients with serum bilirubin levels above 10 mg/dl, was significantly reduced with this procedure. PTD proved to be very useful in the management of acute obstructive suppurative cholangitis and ensuing liver abscesses. Continuous drainage was also achieved by PTD in inoperable cases, and one patient with a hilar carcinoma was kept alive for 3 yr and 1 month by PTD alone. With the improvement in the diagnosis of biliary tract disease, this procedure will assume an important position in the management of obstructive jaundice.

5747 THE RELATIONSHIP BETWEEN BILIARY TRACT INFECTIONS AND POSTOPERATIVE COMPLICATIONS.

(Eng.) Cox, J. L.; Helfrich, L. R.; Pass, H. I.; Osterhaut, S.; Shingleton, W. W. (Duke Univ. Medical Center, Durham, NC). *Surg. Gynecol. Obstet.* 146(2): 233-236; 1978.

The hospital records of 870 consecutive patients undergoing elective biliary tract operations during an 8-yr period are reviewed to determine the incidence of biliary tract infections and positive cultures in chronic biliary tree infections. In addition, the presence of bacteria in the biliary tract was correlated with the development of postoperative wound infections, postoperative cholangitis, and septicemia. Bacteriologic cultures of the biliary tract obtained in 451 patients were correlated with specific biliary tract abnormalities and with postoperative complications. The incidence of positive biliary tract cultures was higher in patients with common duct disease (60%) than in those with chronic gallbladder disease without common duct disease (19%). Choledocholithiasis and partial common bile duct obstruction are viewed as important factors in causing a high incidence of positive biliary tract cultures. Eighty-eight percent of patients who had undergone previous biliary tract decompression procedures had positive cultures. There was no difference in the yield of positive cultures taken from the gallbladder wall and the gallbladder bile. Forty-nine percent of patients with common bile duct disease and positive biliary tract cultures had no history of clinical cholangitis. Postoperative wound infections were more common in patients with common duct disease (8.8%) than those without it (2.8%). *Escherichia coli, Aerobacter,* and Enterococci accounted for nearly 80% of all positive cultures from the biliary tract. The incidence of postoperative wound infections in the 607 patients who received antibiotics preoperatively was 5.8%. Among 263 patients who received no antibiotics, wound infections developed in 5. Among 262 patients who underwent common bile duct operations, 252 received antibiotics beginning 12 hr before surgery and continuing for 2 to 7 days postoperatively of whom 17 developed cholangitis. Seven of the ten patients who did not receive antibiotics developed cholangitis. The results demonstrate that antibiotics should be used to cover any surgical procedure involving the biliary tract in patients with common duct disease.

5748 HEPATIC FUNCTION FOLLOWING PORTOENTEROSTOMY FOR EXTRAHEPATIC BILIARY ATRESIA.

(Eng.) Sondheimer, J. M.; Shandling, B.; Weber, J. L.; Cutz, E.; Gall, D. G. (State Univ. New York, Upstate Medical Center, 750 E. Adams St., Syracuse, NY 13210). *Can. Med. Assoc. J.* 118(3):255-258; 1978.

Liver structure and function in 10 patients with extrahepatic biliary atresia were studied after portoenteric anastomosis (Kasai operation). Bile flow adequate to reduce the serum bilirubin concentration (minimum, <1.0-4.2 mg/dl) was established in five patients (improved group), three of whom became anicteric. The serum bilirubin concentration did not decrease in the remaining five patients (unimproved group), the minimum levels being 8.7-13.5 mg/dl. Hepatic effluent collected postoperatively from both groups contained small amounts of cholesterol and bilirubin; bile salts, however, were present in the hepatic effluent of only the improved patients. Liver biopsy specimens obtained postoperatively from the five improved patients showed partial (in 2) or complete (in 3) relief of cholestasis; hepatic fibrosis, however, was unchanged (in 1) or worse (in 4). The serum concentrations of bile salts were markedly elevated, despite normal excretion of sodium BSP and rose bengal in two anicteric patients studied 14 and 24 months postoperatively. It is concluded that neither structure nor function of the liver is normalized by portoenterostomy even in clinically well, anicteric patients.

5749 THE USE OF ULTRASOUND IN SUSPECTED CHOLECYSTITIS.

(Eng.) Wilson, R. L.; Shaub, M. (Univ. California at Los Angeles Sch. Medicine, Los Angeles, CA). *Appl. Radiol.* 7(1):119-121; 1978.

More than 300 patients with suspected gallbladder disease were examined over a 4-month period in an effort to expand the criteria for a positive diagnosis of the disease. Most patients had previously been examined by at least one radiographic contrast method and had not been successfully visualized. Some patients were examined ultrasonically without benefit of radiographic methods due to allergies or to emergency situations. The criteria for a positive diagnosis of gallbladder disease included the unequivocal demonstration of gallstones but were expanded to include nonvisualization of the gallbladder, obvious acoustic shadowing that originated in the gallbladder region, thickening of the gallbladder wall, and a contracted gallbladder. The expanded criteria were strongly dependent upon strict adherence to a fat-free diet in cases where the patient was not restricted to i.v. fluids. The scanning technique employed was also a very important factor. False-positive results were in the range of 2%, and false-negative results in the range of 1%. All cases received surgical confirmation.

5750 ON THE PATHOGENESIS OF ACUTE CHOLECYSTITIS.

(Eng.) Sjodahl, R.; Tagesson, C.; Wetterfors, J. (Dept. Surgery, Univ. Linkoping, Linkoping, Sweden). *Surg. Gynecol. Obstet.* 146(2):199-202; 1978.

Information concerning the pathogenesis of acute cholecystitis, particularly the role of lysolecithin, is reviewed. At operation for acute cholecystitis, the gallbladder is distended and the passage through the cystic duct is usually blocked by a stone impacted in the neck of the gallbladder. Thus, cholecystitis is a localized inflammatory process, and it should be mediated by local factors. This hypothesis is in agreement with the fact that inflammatory mediators, in general, are released, formed, or activated locally at the site of inflammation. Bacterial growth in the gallbladder bile is probably secondary to an initially aseptic inflammation. Among the chemical agents proposed as mediators of an acute cholecystitis is lysolecithin, known to impair the function of biologic membranes through its surface activity. Lysolecithin causes cell damage and an ensuing inflammatory reaction in the gallbladder. In gallbladder bile from patients operated upon for acute cholecystitis, there is a relative increase in the amount of lysolecithin. The lysolecithin-lecithin ratio is increased. Prerequisites for a local lysolecithin formation in the human gallbladder are at hand since phospholipase A, which transforms lecithin to lysolecithin, is present in the epithelium. Inflammatory mediators also have in common the property of being locally inhibited or inactivated. Accordingly, lysolecithin can undergo different chemical changes; a lysophospholipase activity can split off the fatty acid or an acylating activity can add a fatty acid. Furthermore, the surface activity of lysolecithin can be locally inhibited by lecithin. Under physiologic conditions, these inflammatory-promoting and inflammatory-suppressing activities may balance each other. However, if a stone is impacted into the neck of the gallbladder, the epithelium is damaged. If phospholipase A is released from the epithelium into the lumen of the gallbladder, the anti-inflammatory factors may be overcome. The lysolecithin formed may damage the epithelium further, release more phospholipase A, and maintain a vicious circle. This could induce an accelerating inflammatory reaction in the wall of the gallbladder.

5751 POSTOPERATIVE PERIOD COMPLICATED BY ACUTE CHOLECYSTITIS.

(Rus.) Baranchuk, V. N. (Second Dept. Surgery, S. M. Kirov Military Medical Acad., Leningrad, USSR). *Vestn. Khir.* 120(1):66-69; 1978.

Of 28,556 patients subjected to laparotomy, 3 developed acute cholecystitis in the early postoperative period. These patients were 49- and 59-yr-old women and a 68-yr-old man. Two patients underwent initial surgery for phlegmonous appendicitis, and one for catarrhal vermiform process. Two patients had a history of cholelithiasis. The patients developed acute cholecystitis on day 2, 4, or 6 after initial surgery. Two patients underwent cholecystectomy with the drainage of the cystic duct, and one patient underwent cholecystectomy with formation of choledochoduodenostomy.

5752 THE INCIDENCE OF CHOLELITHIASIS IN AN AUTOPSY SERIES.

(Eng.) Hogan, J.; Lonergan, M.; Holland, P. D. J. (Royal Infirmary Hosp., Leicester, England). *Ir. Med. J.* 70(20):608-611; 1977.

The presence or absence of gallstones was recorded in relation to age, sex, cause of death, evidence of macroscopic gallbladder disease, associated malignancy, and atherosclerosis in a review of 1,000 autopsies performed in Ireland. In 30 cases, the gallbladder had already been removed. Of the remaining 970 cases, 103 cases with gallstones were recorded. All patients were over 21 yr old, and the frequency of gallstones generally increased with age in both sexes, the peak incidence being in those 80-89 yr. An unexpected finding was the statistically significant correlation between the incidence of gallstones and malignancy; 23.3% of 103 patients with cholelithiasis had malignancy, whereas only 14.4% of the 867 patients without gallstones had malignancy ($p<0.05>0.02$). The types of malignancy were of diverse origins, but an association was considered to exist between carcinoma of the pancreas and the presence of gallstones; one in four of the associated malignancies occurred in the pancreas. Sixty-two of the gallstone cases had associated moderate to severe degrees of atherosclerosis. The frequency of gallstones in this series is lower than that previously reported in Great Britain and Germany.

5753 BACTERIOLOGICAL STUDIES OF COMMON DUCT BILE IN PATIENTS WITH GALLSTONE DISEASE AND JUXTA-PAPILLARY DUODENAL DIVERTICULA.

(Eng.) Lotveit, T.; Osnes, M.; Aune, S. (Ulleval Hosp., Oslo 1, Norway). *Scand. J. Gastroenterol.* 13(1): 93-95; 1978.

To analyze the incidence of bacterial colonization in the common duct bile in gallstone diseases and duodenal diverticula, bile samples from the common duct were collected at cholecystectomy from 11 patients with juxta-papillary duodenal diverticula without biliary obstruction and from 27 patients without diverticula and cultivated aerobically and anaerobically. All patients had chronic cholecystitis and cholelithiasis but no biliary obstruction. A significantly higher incidence of positive cultures was found in patients with diverticula (81.1%) than those without (7.4%, $p<0.01$). The positive samples contained bacterial species belonging to the intestinal flora. The authors propose an ascending route of infection and assume that bacteria may play a role in the formation of gallstones often seen in patients with juxta-papillary duodenal diverticula.

5754 BILIARY LIPID EXCRETION IN PATIENTS WITH PIGMENT GALLSTONES: A COMPARISON WITH CHOLESTEROL GALLSTONE PATIENTS. (Eng.) Wagner, C. I.; Trotman, B. W.; Soloway, R. D. (Hosp. Univ. Pennsylvania, 3600 Spruce St., Philadelphia, PA 19104). *Am. J. Dig. Dis.* 23(1):85-88; 1978.

To measure biliary lipid excretion in pigment gallstone patients and to better understand cholesterol gallstone formation, the kinetics of biliary lipid excretion were studied in three patients who had been cholecystectomized for pigment gallstones and the results compared to those previously obtained in patients cholecystectomized for cholesterol gallstones. Pigment stone patients had hyperbolic relationships between cholesterol and phospholipid outputs and bile salt output that were similar to those seen in cholesterol stone patients. However, pigment stone patients excreted more cholesterol and phospholipid at high bile salt output (0.091 ± 0.008 and 0.548 ± 0.101 µmol/kg/min, resp.) than did cholesterol stone patients (0.052 ± 0.002 and 0.178 ± 0.009 µmol/kg/min, resp., $p<0.001$), but approached those levels more gradually than did cholesterol stone patients ($p<0.001$). As a result, pigment stone patients produced bile undersaturated with cholesterol at a lower bile salt output than did cholesterol stone patients (0.120 versus 0.160 µmol/kg/min), and thus they would be less likely to produce supersaturated bile during low bile salt output, such as that occurring during an overnight fast. The data suggest that cholesterol stone patients, in addition to excreting more cholesterol and less bile salts than do normal individuals, have a defect in the rate of lipid output in response to decreasing bile salt output.

5755 URSODEOXYCHOLIC ACID TREATMENT OF GALLSTONE: DOSE-RESPONSE STUDY AND POSSIBLE MECHANISM OF ACTION. (Eng.) Maton, P. N.; Murphy, G. M.; Dowling, R. H. (Guy's Hosp. and Medical Sch., London SE1 9RT, England). *Lancet* 2(8052/3):1297-1301; 1977.

To determine the optimum dose for the medical treatment of gallstones with ursodeoxycholic acid (UDCA), 11 non-obese patients with radiolucent gallstones received 5, 10, and 15 mg UDCA/kg daily for 6 weeks each. Apart from three patients who required surgery for gallstone complications, treatment was well tolerated, and both dyspeptic symptoms and frequency of biliary colic were reduced. Neither diarrhea nor hypertransaminasemia occurred during therapy. Of three patients completing 6 months' treatment with an average of 8 mg UDCA/kg daily, one showed complete and two partial dissolution of gallstones. There were significant negative correlations between the biliary cholesterol saturation index and the percentage UDCA in biliary bile acids ($r=-0.65$, $p<0.005$) and percentage UDCA plus chenodeoxycholic acid (CDCA) in biliary bile acids ($r=-0.65$, $p<0.005$). Mean γ-glutamyltranspeptidase activity fell significantly during treatment (by 47%, 38%, and 62% after 6 weeks' treatment with 5, 10, and 15 mg UDCA, $p<0.05$), whereas other liver function tests and hepatic histology remained normal. Mean serum cholesterol levels did not change, and although there was a 13-35% fall in fasting serum triglycerides, this difference was not statistically significant. UDCA, like CDCA, seems to act by inhibiting hepatic cholesterogenesis. In five patients treated with 5 mg UDCA/kg daily for 1 to 6 months, the mean hepatic hydroxymethylglutaryl-coenzyme-A reductase activity was 28% lower than in untreated gallstone patients. These preliminary results suggest that UDCA is as effective as CDCA in one-half to two-thirds the dose and that 10 mg UDCA kg/day should be effective in most gallstone patients.

5756 CHARACTERIZATION OF HIGH DENSITY LIPOPROTEINS IN HUMAN CHOLESTASIS. (Eng.) Arnesjo, B.; Danielsson, B.; Ekman, R.; Johansson, B. G.; Petersson, B. G. (Inst. Biochemistry, Univ. Lund, Lund, Sweden). *Scand. J. Clin. Lab. Invest.* 37(7):587-597; 1977.

The density distribution, electrophoretic mobility, particle size distribution, and protein and lipid composition of plasma high density lipoproteins (HDL) from patients with long-standing cholestasis were studied by several methods including crossed immunoelectrophoresis, gel filtration, and zonal ultracentrifugation. The crossed immunoelectrophoretic pattern against anti-HDL was characterized by the presence of several immunoprecipitates, in contrast to the pattern formed by normal HDL. One of these precipitates corresponded to a lipoprotein species dominated by apoprotein A-II (apo A-II). Zonal ultracentrifugation of cholestatic plasma showed a decrease of HDL and a disappearance of the normal delineation of HDL_2 and HDL_3. In addition, a new component designated HDL_1-C was observed. Consistent results were found in studies of the molecular size distribution of cholestatic HDL by gel filtration on Sephadex G-200. The lipid and apoprotein composition of isolated cholestatic HDL fractions differed considerably from normal. Most notable were the high proportions of phospholipids and free cholesterol and the occurrence of the apoprotein E (arginine-rich protein) in remarkably high amounts especially in the abnormal HDL_1-C. The HDL_1-C readily obtained by zonal centrifugation of plasma from patients with long-standing obstructive jaundice might serve as a suitable material for further studies of the formation and metabolic fate of human HDL.

5757 CHOLEDOCHAL CYST: ETIOLOGICAL CONSIDERATIONS AND SURGICAL MANAGEMENT IN 22 CASES.

(Eng.) Kimura, K.; Tsugawa, C.; Ogawa, K.; Matsumoto, Y.; Yamamoto, T.; Kubo, M.; *et al.* (Kobe Children's Hosp., 1-1-1, Takakuradai, Sumaku, Kobe #654, Japan). *Arch. Surg.* 113(2):159-163; 1978.

Experience with two different surgical approaches to the management of choledochal cyst, excision or choledochocystenterostomy, is presented. In the 14-yr period from 1962 to 1976, there were 22 cases of choledochal cyst. Choledochocystenterostomy to the duodenum was carried out in three cases and to the jejunum in a Roux-en-Y operation in four cases. Excision of the cyst with hepaticojejunostomy was performed in 14 cases, and in the remaining case, cyst excision with end-to-end anastomosis of the common bile duct was carried out. There was one death in the choledochocystenterostomy group and one in the excision group. In five cases, direct cholangiography, either operative or endoscopic, demonstrated a reflux of the contrast material from the biliary system to the pancreatic duct. In four cases, the amylase level of the cystic content was elevated, ranging from 182 to 50,820 Somogyi U. A reflux of the pancreatic juice into the biliary system was thought to be a possible cause of choledochal cyst. Excision of the cyst with hepaticojejunostomy in a Roux-en-Y operation seems to be the treatment of choice from the aspects of cholangitis, malignant change, and termination of the pancreatic reflux to the biliary system.

5758 Tc-99m PYRIDOXYLIDENE GLUTAMATE IN JAUNDICED PATIENTS. (Eng.) Lubin, E.; Rachima, M.; Oren, V.; Weininger, J.; Trumper, J.; Kozenitzky, I.; *et al.* (Beilinson Medical Center, Petah Tiqva, Israel). *J. Nucl. Med.* 19(1):24-27; 1978.

The efficacy of ^{99m}Tc-pyridoxylidene glutamate (PG) in the differential diagnosis of medical from surgical jaundice was tested in 90 patients, 85 of whom were jaundiced. This substance appeared in the gallbladder 10-15 min after its i.v. injection, and in the gastrointestinal tract at 30 min. On the basis of the time of appearance in the intestine, four groups of patients were recognized: (1) 17 patients with a normal pattern, with visualization of the gut at 30 min; (2) 19 patients with a slight delay in passage, with appearance in the gut between 30-180 min; (3) 29 patients showing very slow excretion visualized only at 24 hr, 21 of whom had parenchymatous disease of the liver, 3, choledocholithiasis, and 5, malignant disease causing partial obstruction; and (4) 25 patients with no visualization of the intestine, of whom 8 proved to be cases of medical jaundice and 17 cases of surgical jaundice. Groups 3 and 4 comprised 54 patients where the question of medical or surgical jaundice was critical. If lack of intestinal activity is considered as indicating surgical jaundice, the accuracy of this study was only 72.4%. The results indicate that radiolabeled PG is excellent for obtaining a clear visualization of the biliary system. The definite appearance of tracer in the small intestine less than 3 hr after injection clearly establishes the patency of the common bile duct.

5759 DIAGNOSIS OF GANGRENE AND PERFORATION OF THE GALLBLADDER BY ENDOSCOPIC RETROGRADE CHOLANGIOGRAPHY. (Eng.) Bill, K.; Belber, J. P. (Veterans Admin. Hosp., 150 Muir Rd., Martinez, CA 94553). *Am. J. Roentgenol.* 130(1):67-70; 1978.

To facilitate the differential diagnosis, three cases in which preoperative diagnosis of gangrenous cholecystitis or gangrene and perforation of the gallbladder was accomplished by endoscopic retrograde cholangiography are described. Gangrene was identified in all three cases by a shaggy outline of the gallbladder wall with amorphous debris and stones in the lumen. Perforation was identified in two cases by extravasation of contrast material into a pericholecystic abscess. This information, as well as the status of the common duct, is important to the surgeon.

5760 ACALCULOUS CHOLECYSTITIS IN NIGERIAN IGBOS. (Eng.) Onuigbo, W. I. B. (General Hosp., Enugu, Nigeria). *Am. J. Surg.* 134(5):564-565; 1977.

5761 PREVALENCE OF GALLSTONES AND GALLBLADDER DISEASE IN CANADIAN MICMAC INDIAN WOMEN. (Eng.) Williams, C. N.; Johnston, J. L.; Weldon, K. L. M. (Clinical Res. Center, 5849 University Ave., Halifax, Nova Scotia B3H 1W2, Canada). *Can. Med. Assoc. J.* 117(7):758-760; 1977.

5762 THE SIMPLIFICATION OF A CLINICAL DATA BASE: APPLICATION TO GALLSTONE PATIENTS. (Eng.) Cavaye, G.; Burnett, W. (Univ. Queensland Dept. Surgery, Greenslopes, Queensland 4120, Australia). *Aust. N.Z. J. Surg.* 47(4):537-540; 1977.

5763 GALLSTONES AND CHENOTHERAPY. (Eng.) Boone, W. T. (Mississippi Baptist Medical Center, Jackson, MS). *J. Miss. Med. Assoc.* 18(10):253-256; 1977.

5764 FINE NEEDLE PERCUTANEOUS TRANSHEPATIC CHOLANGIOGRAPHY IN THE INVESTIGATION OF CHOLESTASIS IN INFANCY. (Eng.) Nelson, R.; Hamlyn, A. N.; Lavelle, I. (Royal Victoria Infirmary, Queen Victoria Rd., Newcastle Upon Tyne, NE1, England). *J. Pediatr. Surg.* 12(5):727-728; 1977.

5765 GASTRIC HETEROTOPIA IN THE GALLBLADDER. (Eng.) Keramidas, D. C.; Skondras, C.; Anagnostou, D.; Doulas, N. (Aglaias Kyriacou Children's Hosp., Athens 608, Greece). *J. Pediatr. Surg.* 12(5):759-762; 1977.

5766 BILIARY TRACT SURGERY. (Eng.) Elliott, D. W. (Kettering Medical Center, 3535 Southern Blvd., Dayton, OH 45429). *South. Med. J.* 70(Suppl. 1):31-35; 1977.

5767 SURGICAL TREATMENT OF COMPLICATED FORMS OF ACUTE CHOLECYSTITIS. (Rus.) Kovalyov, M. M.; Shevchenko, V. S.; Arikiants, M. S. (Dept. Hospital Surgery, Kiev Medical Inst., Kiev, USSR). *Klin. Khir.* (2):15-19; 1977.

5768 SURGICAL TACTICS IN ACUTE CHOLECYSTITIS INVOLVING THE EXTRAHEPATIC BILE DUCTS. (Rus.) Karavanov, G. G.; Orel, G. L. (No affiliation given). *Klin. Khir.* (2):10-15; 1977.

5769 WHEN IS CHOLECYSTECTOMY INDICATED IN ACUTE CHOLECYSTITIS? (REMARKS ON PAPER BY A. M. TETDOEV AND Iu. M. STOYKO: "IS CHOLECYSTECTOMY NECESSARY IN ACUTE CHOLECYSTITIS COMPLICATED WITH JAUNDICE"). (Rus.) Toritsyn, V. A. (Dept. General Surgery, Tyumen Medical Inst., Tyumen, USSR). *Klin. Khir.* (2):79-82; 1977.

5770 ERRORS AND RISKS IN SURGERY FOR CHOLECYSTITIS. (Rus.) Milonov, O. B.; Smirnov, V. A.; Movchun, A. A. (Dept. Hepatic and Biliary Surgery, All-Union Scientific Res. Inst. Clinical and Experimental Surgery, Moscow, USSR). *Khirurgiia (Mosk.)* (3):102-106; 1977.

5771 ACUTE DESTRUCTIVE CHOLECYSTITIS IN CHILDREN. (Rus.) Islambekov, G. K.; Karimov, R. K.; Zlotkevich, I. I. (Dept. Pediatric Surgery, Central Asiatic Inst. Pediatric Medicine, USSR). *Vestn. Khir.* 118(3):102-104; 1977.

5772 CHOLECYSTITIS AND ITS COMPLICATIONS. (Rus.) Shalimov, A. A.; Domansky, B. V.; Shalimov, S. A. (Kiev Scientific Res. Inst. Clinical and Experimental Surgery, Kiev, USSR). *Klin. Khir.* (2):1-10; 1977.

5773 INDICES OF THE EXTERNAL SECRETORY FUNCTION OF THE LIVER IN ULCER DISEASE ASSOCIATED WITH CHOLECYSTITIS. (Rus.) Gotsuliak, O. F.; Shevchenko, B. I.; Kolomoyets, M. Yu. (Dept. Therapy, Chernovtsy Medical Inst., Chernovtsy, USSR). *Vrach. Delo* (3):22-25; 1977.

See also, 5207, 5327, 5336, 5340, 5341, 5342, 5346, 5366, 5371, 5372, 5373, 5374, 5411, 5414, 5479, 5531, 5647, 5648, 5665, 5682, 5732, 5775, 5776, 5834.

GENERAL

5774 NEW PRESENTATION OF ALPHA HEAVY CHAIN DISEASE: NORTH AMERICAN POLYPOID GASTROINTESTINAL LYMPHOMA: CLINICAL AND CELLULAR STUDIES. (Eng.) Cohen, H. J.; Gonzalvo, A.; Krook, J.; Thompson, T. T.; Kremer, W. B. (Veterans Admin. Hosp., Durham, NC 27705). *Cancer* 41(3):1161-1169; 1978.

The case of a 39-yr-old man from the United States with polypoid lymphoma of the gastrointestinal tract and a prolonged clinical course, who had the characteristic alpha heavy chain disease protein, is described. He did not have malabsorption, and the gastrointestinal tract, though containing multiple discrete lymphomatous polyps, had little plasmacytic reaction. Lymphosarcoma cell leukemia developed late in the course and the malignant cells had the characteristics of B lymphocytes but did not contain alpha heavy chains. The data support the contention that the lymphoma in this form of alpha heavy chain disease may involve B lymphocytes but that the abnormal protein may be produced by other cells. Polypoid varieties of gastrointestinal lymphoma in North America must now be considered part of the spectrum of alpha heavy chain disease and the diagnostic protein searched for diligently.

5775 ANTACID TITRATION IN THE PREVENTION OF ACUTE GASTROINTESTINAL BLEEDING: A CONTROLLED, RANDOMIZED TRIAL IN 100 CRITICALLY ILL PATIENTS. (Eng.) Hastings, P. R.; Skillman, J. J.; Bushnell, L. S.; Silen, W. (Harvard Medical Sch., Boston, MA 02215). *N. Engl. J. Med.* 298(19):1041-1045; 1978.

The value of antacids in the treatment and prevention of acute gastrointestinal ulceration and bleeding was assessed in 100 critically ill patients, many of whom had definite risk factors for the development of this complication. The patients were randomized into two groups. One group (51 patients) received antacid prophylaxis, and the other (49 patients) received no specific form of prophylaxis. Hourly antacid titration kept the pH of the gastric contents above 3.5. Two of the 51 patients who received antacid prophylaxis had gastrointestinal bleeding, whereas 12 of the 49 control patients bled ($p<0.005$). Of the 12 controls who bled, 7 were placed on antacid medication, and all 7 apparently stopped bleeding. Analysis of all the patients showed that an increasing prevalence of respiratory failure, sepsis, peritonitis, jaundice, renal failure, and hypotension was correlated with a greater frequency of bleeding ($p<0.05$ to 0.005). No patients required operative treatment to control bleeding. These data indicate that the occurrence of acute gastrointestinal bleeding in critically ill patients can be reduced by antacid titration.

5776 MITOMYCIN-C ALONE AND IN COMBINATION WITH INFUSED 5-FLUOROURACIL IN THE TREATMENT OF DISSEMINATED GASTROINTESTINAL CARCINOMAS. (Eng.) Buroker, T. R.; Kim, P. N.; Baker, L. H.; Ratanatharathorn, V.; Wojtaszak, B.; Vaitkevicius, V. K. (Wayne State Univ. Sch. Medicine, 540 E. Canfield Ave., Scott Hall, Detroit, MI 48201). *Med. Pediatr. Oncol.* 4(11):35-42; 1978.

The efficacy of combination chemotherapy with 5-fluorouracil (5FU) and mitomycin C was studied in 132 previously untreated patients with metastatic adenocarcinoma of the gastrointestinal tract who were randomized to receive either a 120-hr infusion of 5FU (1,000 $mg/m^2/24$ hr x 5 days) with mitomycin-C (20 mg/m^2, i.v., on day 1) or mitomycin-C alone. 5FU was given monthly, while mitomycin C was given every 8 weeks. Superiority of the combination treatment was demonstrated with remissions in 30 out of 82 patients versus 9 out of 50 with the single drug treatment ($r=0.02$). The median survival with 5FU-mitomycin-C was 29 weeks, as opposed to 20 weeks with mitomycin-C alone ($p=0.03$). The combination produced significantly ($p<0.003$-0.005) more severe myelotoxicity than the single drug, and jaundiced patients experienced more myelosuppression than nonjaundiced patients with both treatments. The combined drug regimen of therapy merits additional randomized trials.

5777 FAILURE TO DETECT SPECIFIC GLUTEN ANTIGENS ASSOCIATED WITH THE IMMUNE AGGREGATES IN THE SKIN IN DERMATITIS HERPETIFORMIS. (Eng.) Eterman, K. P.; Nefkens, M. J. J.; van der Meer, J. B. (Dept. Autoimmune Diseases, Univ. Amsterdam, Amsterdam, Netherlands). *Arch. Dermatol. Res.* 260(3): 247-252; 1977.

To determine whether the skin lesions in dermatitis herpetiformis (DH) are induced by gluten, the uninvolved skin of 10 patients with this disease was examined for the presence of gluten antigens with the immunofluorescence technique using a rabbit anti-gliadin antiserum, human antibodies to wheat and to reticulin conjugated to fluorescein-isothiocyanate (FITC), and class-specific anti-human IgA. In all patients, IgA deposits were found in the tips of the dermal papillae of the uninvolved skin. With the anti-wheat and anti-reticulin conjugates, as well as with the rabbit anti-gliadin antiserum, no specific immunofluorescence was observed in any of the skin specimens. Skin biopsy sections of three DH patients were treated with an acid solution (pH 3.2) in an effort to dissociate antigen-antibody complexes that might be present. After the elution procedure, the sections showed undiminished IgA fluorescence, and retesting with the anti-wheat- and anti-reticulin antisera again gave negative results. The skin eluates, two of which contained IgA, had no antibodies to wheat or reticulin. These findings do not support the hypothesis that the antigens in the suspected immune complexes in the DH skin consist of gluten.

5778 THE CONTROL OF ACUTE DIARRHEA IN A LARGE INDUSTRIAL PLANT. (Eng.) Martins, J. K.; Roedl, G. (Medical Dept., Ford Motor Company, St. Paul, MN 55116). *J. Occup. Med.* 20(4):269-272; 1978.

One hundred employees with acute diarrhea at a large industrial plant were studied for 4 months to determine if loperamide hydrochloride treatment would control diarrheal symptoms, reduce absenteeism due to the condition, and be well-tolerated. Diarrhea was controlled with a median dosage of 3 capsules (6 mg total dose) and a range of 2 to 12 capsules. Ninety-six percent of the subjects were controlled after the 1st day, 98% by the 3rd day. Side-effects were generally minor in nature. Substantially more than 1,000 man-hr of lost time were saved because of the treatment. Known drug dependents did not suffer from central nervous system effects. Loperamide acts directly on the intestinal wall to inhibit excessive peristalsis, thereby providing prompt, effective relief, with normal bowel patterns observed in the treated patients. The simple, individualized dosage is patient-oriented, rather than based on a fixed regimen. Because of its rapid onset of action, effective control of symptoms, low dosage, and tolerability, loperamide meets the criteria for an effective antidiarrheal agent in industry.

5779 INTERACTION OF POLYMORPHONUCLEAR NEUTROPHILS WITH Escherichia coli: EFFECT OF ENTEROTOXIN ON PHAGOCYTOSIS, KILLING, CHEMOTAXIS, AND CYCLIC AMP. (Eng.) Bergman, M. J.; Guerrant, R. L.; Murad, F.; Richardson, S. H.; Weaver, D.; Mandell, G. L. (Univ. Virginia Sch. Medicine, Charlottesville, VA 22901). *J. Clin. Invest.* 61(2): 227-234; 1978.

The effect of enterotoxin on the interaction of human polymorphonuclear neutrophils (PMN) with *Escherichia coli* was examined. Enterotoxigenic and nonenterotoxigenic strains, including serotypes of *E. coli* identical except for the presence or absence of the plasmid coding for enterotoxin production, were utilized. Enterotoxigenic and nonenterotoxigenic *E. coli*, tumbled with PMN, were phagocytized and killed (>97%) equally well, and these strains stimulated PMN hexose monophosphate shunt activity equivalently. However, a chemotaxis assay under agarose demonstrated that filtrates of 10 enterotoxigenic strains were less chemotactic for PMN by 15 ± 2% total migration or 46 ± 1% directed migration, when compared with 6 nonenterotoxigenic strains ($p<0.001$). Inactivation of the enterotoxin by heat (65 C for 30 min) or antibodies formed to *E. coli* enterotoxin eliminated the inhibitory effect of the enterotoxic filtrates for PMN chemotaxis. The addition of purified *E. coli* enterotoxin directly to the PMN decreased chemotaxis to *E. coli* filtrates by 32 ± 2% ($p<0.001$).

These data suggest that the effect was due to the heat-labile enterotoxin. The phosphodiesterase inhibitor, 1-methyl-3-isobutylxanthine (0.1 mM), which potentiates effects due to an increase in intracellular cyclic AMP, further decreased total PMN migration (random plus directed) toward enterotoxic filtrates to 46% of that to nonenterotoxic filtrates ($p<0.001$). Addition of cholera toxin (1 μg/ml) to the PMN inhibited total migration toward nonenterotoxic filtrates by 16 ± 2% ($p<0.001$). Exogenous dibutyryl cyclic AMP (2 mM) inhibited total PMN migration toward *E. coli* filtrates by 32% ($p<0.001$). PMN intracellular cyclic AMP levels increased by 220% after 2 hr of incubation with purified *E. coli* enterotoxin. The decreased chemotaxis of enterotoxic *E. coli* filtrates appears to be related to the ability of enterotoxin to increase cyclic AMP and PMN. Enterotoxin production by *E. coli* may be advantageous to the microbe by decreasing its chemotaxis for PMN.

5780 RELATIONSHIPS OF MESENTERIC THROMBOEMBOLISM, ORAL FEEDING, AND NECROTIZING ENTEROCOLITIS. (Eng.) Lehmiller, D. J.; Kanto, W. P., Jr. (Medical Coll. Georgia, Atlanta, GA). *J. Pediatr.* 92(1):96-100; 1978.

To investigate the role of umbilical vessel catheterization and thromboemboli in the development of necrotizing enterocolitis, mesenteric blood vessels were examined in postmortem specimens of 30 infants with necrotizing enterocolitis (16 cases) or other lesions (14 cases). Mesenteric thromboemboli were observed in 12 of the infants with necrotizing enterocolitis ($p<0.001$). Umbilical vessel catheters were apparently responsible for the emboli. Multiple instances of thrombosis and thromboembolism were detected in other organs. Ninety-four percent of infants with necrotizing enterocolitis were orally fed ($p<0.001$). Mesenteric thromboemboli were more frequent in infants who were fed via the digestive route while an umbilical arterial catheter was in place (11/15) than in those who were either never orally fed or in whom oral feeding had not been initiated until after the removal of the umbilical arterial catheter (3/10, $p<0.05$). Mesenteric thromboembolism in these infants is postulated to have been attributable to increased postprandial blood flow in the mesenteric vessels.

5781 CALCIUM AND SECRETIN AS PROVOCATIVE STIMULI IN THE ZOLLINGER-ELLISON SYNDROME. (Eng.) Mihas, A. A.; Hirschowitz, B. I.; Gibson, R. G. (Div. Gastroenterology, Univ. Alabama in Birmingham, Univ. Station, Birmingham, AL 35294). *Digestion* 17(1):1-10; 1978.

The use of calcium and secretin in stimulatory tests of gastrin release in the differential diagnosis of the Zollinger-Ellison syndrome from non-Zollinger-Ellison duodenal ulcer was tested in 8 patients with the Zollinger-Ellison syndrome and 18 patients with duodenal ulcer disease. The i.v. infusion of calcium gluconate (5 mg Ca^{2+}/kg/hr) produced marked increases in serum gastrin levels in the patients with Zollinger-Ellison syndrome (4,350 ± 1,625 pg/ml) and very slight increases in the patients with duodenal ulcer disease (140 ± 49 pg/ml). Secretin (2 IU/kg) given as a single i.v. injection also induced marked elevations in serum gastrin in the group with the Zollinger-Ellison syndrome (4,063 ± 1,990 pg/ml). By contrast, i.v. secretin resulted in a progressive fall in serum gastrin levels in the duodenal ulcer group (from 119 to 97 pg/ml). These results suggest that both stimuli are very useful diagnostic tools in discriminating between Zollinger-Ellison and non-Zollinger-Ellison patients. The secretin challenge test is felt to be superior to the calcium infusions because it is simpler, safer, and very rarely produces false-negative or -positive results.

5782 EFFECTS OF RENAL FAILURE ON BLOOD LEVELS OF CIMETIDINE. (Eng.) Ma, K. W.; Brown, D. C.; Masler, D. S.; Silvis, S. E. (Minneapolis Veterans Admin. Hosp., Minneapolis, MN 55417). *Gastroenterology* 74(2, Part 2):473-477; 1978.

To determine the effect of varying degrees of renal insufficiency on the blood levels of cimetidine after i.v. administration and the rate of removal of cimetidine by hemodialysis, serial blood samples for determination of drug levels were obtained from 16 patients with varying degrees of renal failure and after the i.v. administration of 300 mg of cimetidine. There was a prolongation of drug half-life in patients with renal insufficiency compared with that in normal controls ($p<0.001$). A significant inverse relationship between the half-life and the creatinine clearance was noted ($r=0.69$, $p<0.01$). The effect of hemodialysis was studied in 12 patients and cimetidine was found to be dialyzable. This was demonstrated both by a shortening of the half-life of the drug during dialysis and by measurement of dialysance. This finding suggests that the dose schedule should be modified for patients with renal insufficiency and for those on hemodialysis. A single i.v. dose of cimetidine was well tolerated by the patients. One patient developed an urticarial skin rash, believed to be allergic in nature. There was a transient, mild (but significant) rise in blood urea nitrogen and serum creatinine concentrations in five patients with moderate renal failure ($p<0.005$ and $p<0.025$, resp.).

5783 MUCONIC ACID STORAGE IN JEJUNAL MUCOSA OF A DIABETIC CHILD [Abstract]. (Eng.) Bobo, R. C.; McCrone, W. C.; Partin, J. C.; Schubert, W. K. (Children's Hosp. Res. Foundation, Cincinnati, OH). *Gastroenterology* 72(5, Part 2):1030; 1977.

5784 EFFECT OF SOMATOSTATIN INFUSION ON PATIENTS WITH CHRONIC RENAL FAILURE [Abstract]. (Eng.) Quatrini, M.; Bianchi, P. A.; Ranzi, T.; Quarto di Palo, F.; Buccianti, G.; Polli, E. E. (I Clinica Medica dell'Universita, Milano, Italy). *Rend. Gastroenterol.* 9(1):64; 1977.

5785 ALCOHOL INDUCED CHANGES IN THE HUMAN RECTAL MUCOSA: LIGHT AND ELECTRONMICROSCOPIC STUDIES [Abstract]. (Eng.) Brozinsky, S.; Grosberg, S.; Fani, K.; Wapnick, S. (Veterans Admin. Hosp., Brooklyn, NY). *Gastroenterology* 72(5, Part 2):1034; 1977.

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5790 3. INVESTIGATION ON CHRONIC DIARRHEA. (Eng.) Groll, A. (Dept. Medicine, Etherington Hall, Queen's Univ., Kingston, Ontario K7L 2V6, Canada). *Can. Med. Assoc. J.* 116(7):742-744; 1977.

5791 5. POSTOPERATIVE DIARRHEA. (Eng.) Loudon, J. L. (Belleville General Hosp., 265 Dundas St. E., P.O. Box 428 Belleville, Ontario, K8N 5A9, Canada). *Can. Med. Assoc. J.* 116(7):748-750; 1977.

5792 ACID-BASE DISTURBANCES IN DIARRHOEA [Abstract]. (Eng.) Caprilli, R.; Vernia, P.; Colaneri, O. (II Medical Clinic, Univ. Rome, Rome, Italy). *Gastroenterology* 72(5, Part 2):1155; 1977.

5793 MANAGEMENT OF BILE SALT DIARRHOEA WITH ALUMINUM HYDROXIDE [Abstract]. (Eng.) Sali, A.; Watkinson, G.; Mackay, C. (Western Infirmary, Glasgow, Scotland). *Gut* 18(5):A419; 1977.

5794 MICROBIAL AGENTS IN STOOLS OF INFANTS AND YOUNG CHILDREN WITH AND WITHOUT ACUTE DIARRHOEAL DISEASE. (Eng.) Sanyal, S. C.; Sen, P. C.; Tiwari, I. C.; Bhatia, B. D.; Singh, S. J. (Inst. Medical Sciences, Banaras Hindu Univ., Varanasi 221005, India). *J. Trop. Med. Hyg.* 80(1): 2-8; 1977.

5795 SCANNING (SEM) AND TRANSMISSION (TEM) ELECTRON MICROSCOPIC OBSERVATIONS OF DIARRHEAL DISEASE PRODUCED BY AN ENTEROPATHIC E. coli STRAIN (RDEC) [Abstract]. (Eng.) O'Hanley, P. D.; Cantey, J. R.; Lushbaugh, W. B.; Inman, L.; Takeuchi, A. (Veterans Admin. Hosp., Charleston, SC). *Gastroenterology* 72(5, Part 2):1109; 1977.

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5799 EFFECTS OF CHOLESTYRAMINE (CH) ON ADHERENCE OF PATHOGENIC E. coli TO INTESTINAL MUCOSA [Abstract]. (Eng.) Bujanover, Y.; Hirschberger, M.; Thaler, M. M. (Dept. Pediatrics, Univ. California, San Francisco, CA). *Gastroenterology* 72(5, Part 2):1034; 1977.

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5802 TRIMETHOPRIM-SULFAMETHOXAZOLE COMPARED TO AMPICILLIN IN THE TREATMENT OF SHIGELLOSIS. (Eng.) Chang, M. J.; Dunkle, L. M.; Van Reken, D.; Anderson, D.; Wong, M. L.; Feigin, R. D. (St. Louis Children's Hosp., 500 South Kingshighway, St. Louis, MO 63110). *Pediatrics* 59(5):726-729; 1977.

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J. (Shanta Bhawan Hosp., P.O. Box 252, Kathmandu, Nepal). *Lancet* 2(8035):463; 1977.

5804 CHOLERA AND BLOOD-GROUPS [Letter to Editor]. (Eng.) Chaudhuri, A.; De, S. (Cholera Res. Center, Calcutta, India). *Lancet* 2(8034):404; 1977.

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5812 THE ULTRASOUND DIAGNOSIS OF RECTUS SHEATH HAEMATOMA. (Eng.) Lee, P. W. R.; Bark, M.; Macfie, J.; Pratt, D. (General Infirmary, Leeds 1, England). *Br. J. Surg.* 64(9):633-634; 1977.

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See also, 5102, 5263, 5299, 5327, 5344, 5350, 5353, 5354, 5379, 5389, 5401, 5402, 5406, 5407, 5409, 5414, 5431, 5432, 5443, 5444, 5446, 5543, 5549, 5550, 5551, 5555, 5559, 5563, 5592, 5623, 5745, 5836.

GENERAL

Parasitology

5829 AN EVALUATION OF LEVAMISOLE FOR TREATMENT OF ASCARIASIS. (Eng.) Miller, M. J.; Farahmandian, I.; Katz, N.; Winsor, E.; Bennett, E. (Faculty Medicine, Univ. Calgary, Calgary, Alberta 12N 1N4, Canada). *South. Med. J.* 71(2):137-140; 1978.

Levamisole was tested in Iran, Brazil, Mississippi, and Louisiana for its efficacy as a single-dose p.o. treatment for *Ascaris* infections. Subjects were children ages 2 to 15 yr, and treatment with levamisole and comparative anthelmintics are as follows: 453 with levamisole (50, 100, or 150 mg for children weighing 10-20, 20-40, or >40 kg, resp.), 461 with piperazine citrate (150 mg/kg, maximum 3.5 g), 17 with pyrantel pamoate (11 mg/kg, maximum 1.0 g), and 19 with a placebo. Cure rates and total reduction in mean egg counts observed were 92% and 98%, resp., for levamisole and 66% and 90%, resp., for piperazine. Sixteen of 17 treated with pyrantel pamoate were cured. In all four studies, side-effects were more frequent with piperazine than with levamisole. Levamisole was found to be a well-tolerated, highly effective single-dose ascaricide. It should prove to be particularly useful for mass chemotherapy in *Ascaris* control programs.

5830 GIARDIASIS. (Eng.) Wolfe, M. S. (Parasitology Lab., Dept. of State, Room 500, 2141 K St. NW, Washington, DC 20037). *N. Engl. J. Med.* 298(6):319-321; 1978.

5831 AMEBIASIS. (Eng.) Krogstad, D. J.; Spencer, H. C., Jr.; Healy, G. R. (Harvard Medical Sch., Boston, MA). *N. Engl. J. Med.* 298(5): 262-265; 1978.

5832 HYDATIDOSIS: A GLOBAL PROBLEM OF INCREASING IMPORTANCE. (Eng.) Matossian, R. M.; Rickard, M. D.; Smyth, J. D. (Dept. Bacteriology and Virology, American Univ. Beirut, Beirut, Lebanon). *Bull. W.H.O.* 55(4):499-507; 1977.

5833 THE ANTHELMINTHIC EFFICACY OF A MIXTURE OF PYRANTEL PAMOATE AND OXANTEL PAMOATE. (Eng.) Kale, O. (Univ. Coll. Hosp., Ibadan, Nigeria). *Curr. Ther. Res.* 22(6):802-806; 1977.

5834 RUPTURE OF A HYDATID CYST OF THE LIVER INTO THE BILIARY TRACT. (Eng.) Stavorovsky, M.; Wientroub, S.; Iellin, A.; Papo, J. (Ichilov Hosp., Tel-Aviv, Israel). *Int. Surg.* 62(11/12):603-608; 1977.

5835 THE EPIDEMIOLOGY OF INFECTION WITH Entamoeba histolytica IN THE GAMBIA, WEST AFRICA. (Eng.) Bray, R. S.; Harris, W. G. (Medical Res. Council Lab., Fajara, Gambia). *Trans. R. Soc. Trop. Med. Hyg.* 71(5):401-407; 1977.

5836 RENAL DISEASE IN HEPATOSPLENIC SCHISTOSOMIASIS: A CLINICOPATHOLOGICAL STUDY. (Eng.) Barsoum, R. S.; Bassily, S.; Baligh, O. K.; Eissa, M.; El-Sheemy, N.; Affify, N.; Hassaballa, A. M. (Faculty Medicine, Cairo Univ., Cairo, Egypt). *Trans. R. Soc. Trop. Med. Hyg.* 71(5):387-391; 1977.

See also, 5263, 5307, 5313, 5314, 5315, 5316, 5376, 5596, 5794, 5805.

GENERAL

Regional Enteritis

5837 SKIN REACTIVITY AND PHAGOCYTIC FUNCTION OF NEUTROPHIL LEUCOCYTES IN CROHN'S DISEASE AND ULCERATIVE COLITIS. (Eng.) Krause, U.; Michaelsson, G.; Juhlin, L. (Univ. Hosp., S-750 14 Uppsala, Sweden). *Scand. J. Gastroenterol.* 13(1): 71-75; 1978.

In an effort to explain the inflammatory reaction in Crohn's disease and ulcerative colitis, the ability of the WBC from 43 patients with Crohn's disease, 20 patients with ulcerative colitis, and from 54 controls to phagocytize yeast particles was investigated. In addition, skin reactivity to bacterial antigens and to vasoactive compounds was tested. A decreased capacity of the WBC to phagocytize yeast particles was observed in patients with Crohn's disease of the ileum in comparison to that seen in 23 healthy controls ($p<0.001$). Patients with Crohn's disease involving only the colon showed normal phagocytic activity, as did patients with ulcerative colitis. The intradermal injection of killed *Streptococcus pyogenes* produced an increased erythematous reaction after 48 hr in patients with ulcerative colitis, and the reaction was pustular in half of them. None of the controls or the patients with Crohn's disease of the ileum had such a reaction. An increased erythematous reaction to streptokinase-streptodornase was more common in patients with ulcerative colitis (88%) than in those with Crohn's disease (48%) or in controls. No such difference was seen with other bacterial antigens. The reactivity to kallikrein, prostaglandin E_1, histamine, and bradykinin were similar in all subjects. Inflammatory changes in the ileum were accompanied by a lowered phagocytosis that might indicate a relationship to the anatomical distribution of the lesions.

5838 MACROPHAGE TURNOVER IN CROHN'S DISEASE AND ULCERATIVE COLITIS. (Eng.) Meuret, G.; Bitzi, A.; Hammer, B. (Kantonsspital, CH-9007 St. Gallen, Switzerland). *Gastroenterology* 74(3):501-503; 1978.

To evaluate the macrophage turnover in Crohn's disease and ulcerative colitis, monocytopoietic proliferation activity was determined in eight patients during severe attacks of Crohn's disease and in six patients with ulcerative colitis. Similar results were obtained in both groups of patients. The fraction of mononuclear phagocytes in bone marrow exceeded the normal range in four patients with Crohn's disease and in two patients with ulcerative colitis. The *in vitro* ^{3}H-thymidine labeling index was markedly increased in seven patients with Crohn's disease and in four patients with ulcerative colitis. Both increases enhanced the monocyte birth rates within the proliferation pool of monocytopoiesis in four of seven patients with Crohn's disease and in three of five with ulcerative colitis. Monocytosis was present in half of all patients. The ^{3}H-thymidine labeling index of blood monocytes was increased in all patients examined except one. The results indicate that Crohn's disease and ulcerative colitis are frequently associated with moderate overproduction of monocytes, which may be assumed to be induced by macrophage demand of the affected tissues. In comparison with other diseases involving inflammations, the monocytopoietic hyperproliferation was moderate. Therefore, the inflammation in Crohn's disease and ulcerative colitis seems to be characterized by a relatively low macrophage turnover induced by pathogenetic mechanisms of moderate macrophage toxicity.

5839 K-LYMPHOCYTES (KILLER CELLS) IN CROHN'S DISEASE AND ACUTE VIRUS B-HEPATITIS. (Eng.) Eckhardt, R.; Kloos, P.; Dierich, M. P.; Meyer zum Buschenfelde, K. H. (Klinikum Charlottenburg der Freien Universitat Berlin, Spandauer Damm 130, D-1000 Berlin 19, W. Germany). *Gut* 18(12):1010-1016; 1977.

Total lymphocyte counts, B-, T-, C'3 receptor-bearing lymphocytes, and killer (K)-cell activity were studied in the peripheral blood of 71 patients with Crohn's disease; 40 normal subjects and 96 patients with inflammatory liver disease served as controls. Patients with active untreated Crohn's disease and acute virus B hepatitis exhibited a markedly increased K-cell activity measured in a plaque assay when compared with normal controls ($p<0.01$). Patients with immunosuppressive-treated Crohn's disease, hepatitis B surface antigen (HBsAg)-positive chronic active hepatitis, and liver cirrhosis showed only a slight increase of K-cell activity ($p<0.01$). In the postacute phase of hepatitis (4-12 weeks from onset), K-cell activity fell to normal levels. The number of B-lymphocytes showed a relative and absolute decrease in all groups of patients. With the exception of patients with acute HBsAg-positive hepatitis and the post-acute phase of hepatitis, all the other groups showed statistically decreased absolute numbers for C'3 receptor-bearing lymphocytes ($p<0.01$). The significant decrease in K-cell activity and the number of T-lymphocytes in Crohn's disease treated with immunosuppressive drugs was interpreted as an effect of azathioprine and prednisone on these lymphocyte subpopulations.

5840 QUANTITATIVE SACROILIAC SCINTIGRAPHY IN PATIENTS WITH CROHN'S DISEASE. (Eng.) Davis, P.; Thompson, A. B. R.; Lentle, B. C. (9-112 Clinical Sciences Building, Univ. Alberta, Edmonton, Alberta, Canada). *Arthritis Rheum.* 21(2):234-237; 1978.

Sixty consecutive patients with Crohn's disease were assessed radiologically and by quantitative sacroiliac scintigraphy for evidence of sacroiliitis and/or ankylosing spondylitis to determine the prevalence of axial skeletal abnormalities. The incidence of radiologic sacroiliitis (11%) and ankylosing spondylitis (5%) was no greater in this series than has been previously reported. However, the incidence of increased uptake of the ^{99m}Tc-stannous pyrophosphate radiotracer at the sacroiliac joints was 52%. The frequency of the tissue antigen HLA-B27 was higher in the 60 patients (20%) than in 295 normal controls (9.2%), but the difference was not significant, nor were there significant differences between the two groups with respect to other tissue antigens. The frequency of HLA-B27 was not statistically higher in Crohn's disease patients with radiologic or bone scan evidence of sacroiliitis compared with those patients without such evidence; however, 10/12 patients with HLA-B27 had evidence of sacroiliitis. The prevalence of inflammatory disease of the sacroiliac joints in patients with Crohn's disease is higher than has been previously reported; bone scanning and x-ray examination may prove useful in the assessment of such patients because the techniques appear to reflect different stages of the disease process. The presence of HLA-B27 may indicate sacroiliitis, but its absence does not exclude the disease.

5841 LABORATORY PARAMETERS AS INDEX OF DISEASE ACTIVITY IN CROHN'S DISEASE [Abstract]. (Eng.) Farack, U. M.; Henneberger, J.; Ewe, K. (Univ. Hosp., Mainz, W. Germany). *Gastroenterology* 72(5, Part 2):1056; 1977.

5842 CROHN'S DISEASE OF THE SMALL BOWEL EXAMINED BY DOUBLE CONTRAST TECHNIQUE: A COMPARISON WITH ORAL TECHNIQUE. (Eng.) Ekberg, O. (Malmo General Hosp., S-214 01 Malmo, Sweden). *Gastrointest. Radiol.* 1(4):355-359; 1977.

5843 FURTHER STUDIES OF VIRAL AGENTS IN CROHN'S DISEASE (CD) [Abstract]. (Eng.) Whorwell, P. J.; Phillips, C. A.; Beeken, W. L. (Dept. Gastroenterology, Univ. Vermont, Burlington, VT). *Gastroenterology* 72(5, Part 2):1149; 1977.

See also, 5550, 5599, 5606, 5607, 5608, 5609, 5616, 5617, 5622.

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